

# COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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## IBM Giveth and IBM Taketh Away

### CPU Prices Rise 4%-8% on 360, 370, 3/10

By Michael Merritt  
CW Staff Writer

WHITE PLAINS, N.Y. — IBM has increased rental prices of System/360 CPUs by about 4%, and increased the rental and purchase prices of System/370

CPUs and the 2880 Block Multiplexer Channel by about 8%. Maintenance rates on 360 CPUs were also increased by 20%.

Purchase and rental prices of the 12 submodels of the small System/3 Model 10, as well as

most System/3 peripherals costs, have been increased 6%.

A number of peripherals, including terminals and card handling peripherals, have also had either rental increases of 3% to 8% or maintenance price in-

creases of 10% to 25%.

Four storage units were given maintenance price decreases of 10% to 25%.

The decreases in maintenance and increases in purchase price have already gone into effect, while the increase in lease and maintenance rates will take effect Nov. 1, after the three month notice required by IBM lease contracts.

IBM didn't increase any prices on mainframe memories except for selective increases on the purchase price of field upgrades on the 155 and 165. Maintenance on the 2365 Large Core Store peripheral was decreased in the 10% to 25% range, though.

According to IBM's statement, the price changes will result in less than a "3% effective increase in systems costs, although the range will be from 1% to 6%."

The price increases partially offset the systems cost reduction brought about by IBM's June 1

reduction of peripherals prices. At that time IBM introduced term lease plans and a discount on purchase price. Industry sources calculated this move reduced system costs 5% on the average.

The increased maintenance rates will hurt third-party leasing companies that cannot contractually pass on the boost to their customers; otherwise it will be the end-user who pays. The increase of 360 rental and 370 rental and purchase may work to the eventual advantage of third-party lessors, however.

IBM attributed the price increases to "the increasing costs of doing business."

Keeping purchase prices constant for 360s while increasing rentals is seen by industry sources as an attempt by IBM to reduce its inventory of 360 equipment by making outright purchase more attractive.

(Continued on Page 4)

## Post Office Shows How Not To Develop Information System

By Joseph Hanlon  
CW Staff Writer

WASHINGTON, D.C. — The Post Office Department's computerized management information system (MIS) costs more and is less useful than previous manual systems, according to the General Accounting Office (GAO).

The GAO report on the Post Office Department (POD) is virtually a textbook of how not to develop an MIS.

When POD started developing the system in 1966, POD said the system would reduce paperwork and at the same time produce more timely and accurate reports. Employees producing manual reports were to be reassigned to other tasks at a saving of \$4.5 million per year.

But inadequate planning, insufficient testing, and excessive haste, the GAO said, resulted in a system that:

- Was over two years late
- Will cost \$60 million, almost twice as much as expected
- Requires more rather than fewer people
- Has "substantially increased costs"
- Has a high error rate
- Produces useless reports.

The Postal Source Data System (PSDS) automatically collects data at the 75 largest post offices concerning mail volume, employee attendance and hours.

Automatic employee badge readers, electronic mail scales, and keyboards at each post of-

fice send data in real-time to dual Control Data Corp. 1700s at one of five concentrator centers.

Data is then sent to dual CDC 3300s at one of two main DP centers. Reports are produced on high-speed printers at the post offices, sometimes within two hours of the original data input.

Despite the difficulties with the system, it is now being expanded to 35 additional post offices, an action that drew particular GAO criticism.

#### Poor Planning

The POD first tested an information system in Minneapolis and Milwaukee from 1962 to 1965. The test was unsatisfactory, according to GAO, and a POD study team recommended further testing be confined to those two offices until the system was made to work.

Instead, the POD decided to implement a significantly different system, PSDS, at all 75 large post offices.

In 1966, the POD negotiated a \$22.7 million contract with CDC for purchase and installation of the entire system, despite the

fact there had been no testing and despite the recommendation, of POD's own ADP Management Division that a lease-purchase approach be used in case the system proved unfeasible.

In its haste to get the system, the POD did not prepare detailed specifications prior to purchase. During the first five months after purchase, the specifications were changed four

(Continued on Page 3)

## Attendees Bucking Economy

### ACM Ponders DP Past, Potential

By a CW Staff Writer

CHICAGO — The computer profession is one of the world's few professions with veterans who remember "the day one." Many of those who remember the first invention in this field are expected here for ACM '71, the observance of the 25th anniversary of computers.

This annual convention of the Association for Computing Machinery, the senior DP society, may draw over 1,000 attendees, a "tribute" to the dedication

and interest of programmers and managers whose companies are not paying expenses because of budget problems, an ACM official suggested.

The Quarter Century View, a lengthy two-session overview of the computer's history and potential, was expected to be one of the most exciting and well-attended features of this year's meeting. While the look-back was scheduled for Tuesday afternoon, the look-ahead is to continue Wednesday morning.

Mayor Richard Daley has even proclaimed this "Computer Quarter Century Week," in ob-

servance of this aspect of the conference, following in the footsteps of New York, which had a computer week for last year's show.

Another highlight was expected to be the awards dinner, to honor the recipient of the first annual Grace M. Hopper Award, named after the Navy Commander who pioneered in developing computer languages and who was on the team that developed Eniac.

The award is sponsored by Univac and is administered by ACM. Recipient was Dr. Donald

(Continued on Page 4)



## Ground Support

Operators at Nasa's Manned Spacecraft Center in Houston view data supporting the Apollo 15 moon mission on Uniscope 300 terminals. Two Univac 1106s analyze the consumption of electrical power, oxygen, fuel, water and other consumables and predict future supply. They are also used to process data on velocity and direction of winds at the launch area, to determine the extent and accuracy of orbit changes caused by firing of the spacecraft engines, and to compute the effect of wind forces during reentry. The center also includes four Univac 1108s.

## 'Consistency' Acpa's Aim In New Programmer Tests

By Edward J. Bride

CW Staff Writer

NEW YORK — Businesses will find it a little easier to hire commercial programmers if an embryonic test bears fruition for the Association of Computer Programmers and Analysts (Acpa).

Noting a "woeful lack of consistency" in DP curricula in both private EDP schools and universities, Acpa has formed a committee to design a Commercial Programmer Qualification Examination, which will be designed to measure both talent and professional level of applicants.

The committee is currently working on an entry-level junior programmer's examination, according to one member, but will soon expand its interest to three or four levels of programmer expertise.

As such, the subsequent examinations could compete with the Registered Business Programmers Examination (RBPE) currently administered by DPMA.

For the moment, however, the Commercial Programmer Qualification Examination of Acpa will present no confrontation to DPMA along industry or educational lines.

(Continued on Page 3)

### On the Inside

Computers to Fight  
'National Problems'

— Page 8

Independents  
Help System/3

— Pages 11, 13

Communications	18
Computer Industry	25
Editorial	6
Education	8
Financial	30
Societies	9
Software/Services	13
Systems/Peripherals	11

# Eastern Airlines Prepares for Supersystem, Twin 195s

By G.F. Maulsby

Special to Computerworld

MIAMI—Just north of the Doral Country Club, Eastern Airlines is building a computer center that will eventually consist of three buildings, one of which will house dual 360/195s

to run Eastern's System One Passenger Service System.

Elements of the system, including reservations, are already running on three 360/65s at the center, and the task of converting a real-time, on-line system as large and as critical as

Eastern's is complicated.

System One will eventually allow passenger self check-in at an airport. A customer with a credit card and reservation will use a terminal to select a seat, obtain a boarding pass and ticket coupons for other legs of his trip. The system will verify the validity of the credit card and prepare a bill.

## 18-Ft. Pert Chart

Planning for the new Doral Computer Center began in late 1967 and, conceptually, it runs a full 18 ft across a Pert chart. The present configuration, built around three 360/65s and a data base of 1,400 daily departures and some two million passenger records, involved plans for growth from the day it went on the air.

The present configuration of System One, which is still in its infancy, is already handling a very hefty workload involving 1,400 daily flights and 80,000 interline messages a day. While the system was available to reservations 99.57% of its scheduled uptime, its central processors operated at 100% occupancy during several peak days; average CPU occupancy was 69.1%.

Plans call for upgrading the entire system to a "supersystem" that will double information storage capacity, triple effectiveness in terms of computer throughput, and fully automate the majority of passenger service clerical functions.

## Planning and Conversion

Essentially, System One is people—people in full control, making computers work for them and their customers. This is the operating philosophy EAL has striven to carry over the the systems planning and conversion

phases of the new 195-based system. It involves people, in this case, data processing professionals, exercising a tremendous amount of control over computers to prepare them to help solve the complex problems and procedures foreseen in the mid-Seventies.

For example, besides implementing the extremely sophisticated new functions planned, the conversion program involves the following changeovers with no interruption to service:

- Conversion from DOS to OS.
- A physical move from one location to another five miles distant.
- Upgrading the on-line, real-time system from the 65s to the 195s.
- Rearranging the entire data base, including two million passenger records, contained on ninety-six 2314 disks to 3330 disks.

The major portion of System One's applications library, involving some 600 online programs with a total of about 600,000 instructions, will be moved without modification. Most offline application programs, made up of another 300,000 instructions, will be modified. Also, test programs are being written for each functional group of online programs to assure that they measure up to standard in the new control environment.

Because of the highly critical nature of the data base conversion, the project has to be implemented in multiple phases. The first phase will move the system to the 195 configuration without any degradation of online reservations network. Initially, the data base will be left on the 2314s.

EAL has already installed OS on the Model 65-based system and have converted many of the offline application programs. By fall, EAL will begin installing OS on one 195 and begin moving the offline applications to it. By the spring of 1972, the entire offline system is scheduled to run on the 195.

Work on the online control program, an advanced version of the Programmed Airline Reservations System (Pars), is being handled in parallel with preparation of the offline system, with completion targeted for late 1971. From then until about mid-1972, EAL will concentrate on testing the online applications programs.

Another phase of the conversion will start about nine months after the 195s go on the air. It will consist of moving the data base from 2314s to 3330s, and will be accomplished in stages.

The full cutover to the 195-based system is scheduled for September, 1972.

## Ops Control Center

Equally and perhaps more important than conversion of one system to another will be control of operations, from second to second, once the "supersystem" is up and running. To accomplish this level of control, Eastern has developed an "Operations Control Center."

Housed in a section of the hardware building adjacent to the computer room, the speci-

ally designed console will be the center of operations, literally, for the entire Doral Computer Center. Operating personnel will have immediately at hand a variety of monitoring and control systems needed to oversee all operations at the center.

For example, the computer room will be continuously monitored via two closed circuit television cameras with pan, zoom, and tilt capabilities. Operations can communicate with the few personnel needed in the computer room at any one time over an internal voice system.

Since System One is the central file for some 3,000 reservations employees, continuous operation is critical and means must be provided to maintain well over 99% of scheduled uptime. Real time operations will be able to switch the entire system from one CPU and its peripherals and control equipment to the other in a few seconds, using a specially designed equipment configuration console.

Any problems reported by remote users of the system, particularly at the 12 reservations centers, will be acted upon by the Data Base Management group. It is staffed by highly qualified individuals, well versed in reservations, computer programming, and the complex software and hardware combination employed.

## Supersystem

The evolution of System One into a "supersystem" housed in a multi-million-dollar computer center will provide immediate benefits such as greater throughput, faster message processing and online response. However, the new system's true significance lies in the capabilities it will provide EAL for fully automating most of the clerical activities associated with the entire range of passenger service functions—from reservations to boarding.

The only way to justify this kind of planning is with proven performance and return on investment, such as System One demonstrated in its first full year of operation. For example:

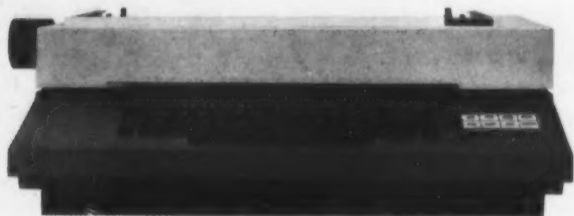
- Studies by EAL's Marketing Department indicate that System One's passenger load planning capabilities have contributed about \$1 million a month in additional revenues.

- Reservations Department statistics show that the average productivity of a full-time reservations employee enplaned climbed more than 30%.

- System One created more than 13 million Passenger Name Records in its first year, and handled an average of 34 CRT agent set transactions a second during regular business hours (45 and up to 67 in peak periods), or 1.4 million transactions on a typical reservations day.

In contrast with these results, the expense of the entire Computer Sciences Department, in which System One is only one of three groups, accounts for less than 1.5% of total operating costs.

G.F. Maulsby is project director for 195 conversion at Eastern Airlines Computer Sciences Department.



This is the new Novar 5-40 MOD II. It has both software and communication compatibility with the 2740 Model 2. There is one big difference, however. The 5-40 MOD II transmits at up to 2400 baud.

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# QANTEL

# Poor Planning Kills Expected Post Office Savings

(Continued from Page 1)

times and then totally scrapped. CDC was forced to halt programming until the POD decided what it really wanted.

Other POD changes further delayed implementation of PSDS, but the equipment was delivered on schedule, which meant that one 3300 was little used for 20 months.

Prior to awarding the contract, POD officials visited only eight of the 75 post offices. When the other post offices were actually visited, officials found the system would require "substantially" more equipment than projected. The contract with CDC has increased from \$22.7 million to \$36 million.

"If precise equipment requirements had been known prior to the award of the contract, more

competition might have been generated and lower prices for the large quantities might have been offered by the bidders," declares the GAO report.

Further, in estimating costs POD assumed that computer equipment could be installed at post offices without difficulty. When installation began, it found that of the first 47 offices, only 11 had adequate electrical power and air conditioning.

## System Doesn't Work

The delays and cost overruns would not be too serious if the system actually worked as planned. But the GAO report notes that rather than saving the POD money, it now costs more to perform employee time and attendance functions than under

the former manual system.

Not only have no employees been reassigned to other duties (which was to produce the bulk of the financial saving), but "some post offices have found it necessary to employ full-time time and attendance clerks to prepare the necessary payroll forms, whereas before the installation of PSDS, such forms were filled out by production employees in their spare time," the report declares.

## Reports Not Useful

During one two-week period, a single post office received a 12-ft high stack of reports. "We question whether such volume of data can be examined timely and adequately for effective use by management," charges the report.

In late 1969 (the time of the GAO field review), post offices were still maintaining manual records "because the reports produced by PSDS were inaccurate or incomplete, or were received too late to be of use."

For example, error reports, such as an employee checking in at 8 a.m. and 1 p.m. but not checking out for lunch, are supposed to be produced within two hours while an employee is still at the office. But the reports were sometimes received as much as 14 hours late, the GAO says.

Up to 1 million uncorrected error messages remain in the system at the end of each pay period and are simply purged, the GAO notes.

Ironically, the large number of unneeded reports seems to be

bogging down the system and causing the errors, while system users demand the extra reports as a way of compensating for errors.

"The reports being generated by PSDS at the time of our review were less timely, less meaningful, and less accurate than reports available prior to installation of PSDS," concludes the GAO report.

The POD declined to comment to CW, but a letter of reply is included in the GAO report. It admits many of the charges made by the GAO, but states that the problems are being corrected. In particular, it claims that reliability, effectiveness, and timeliness of reports have been improved since the GAO did its study.

## Acpa Sees Tests Easing DP Hiring

(Continued from Page 1)

tional lines, stated Les Stevens, vice-president of Creative Logic Corp. and management representative to the committee.

Moreover, when Acpa does expand its examinations, this might lead to a "union of efforts" with other groups seeking personnel standards, rather than competition, he said.

### 'Contribution to DP Field'

The organization's newsletter "Thru-put" claimed the development of the test could be Acpa's "most important contribution to the EDP field."

"It is paramount that a good qualification examination be established to provide a sound standard of measure for programmers entering the profession," the newsletter stated.

Chairman of the Professional Standards and Certification Committee, which has been charged with developing the exam, is Stan Fisher, director of the data center at City University of New York's graduate school for doctoral candidates.

The five other members represent various bodies concerned with professionalization efforts regarding EDP schools, systems analysts, manufacturers, system and application programmers, and the association itself.

### Professionals?

Acpa is represented on the committee by its president, Paul Notari, who appeared before the Labor Department hearings last winter in Washington [CW, Feb. 10]. Purpose of those hearings was to determine whether programmers and analysts should be considered "professionals" and therefore exempt from minimum wage and — more appropriately — overtime pay laws.

While no specific government stand has elicited from those hearings, the need for such standards and tests was pointed out by the Communications Workers of America, one of the largest labor unions in the land.

The CWA representative told the hearings that programmers should not be considered professionals since there was no certification examination and since they "failed" to meet the Labor Department's educational test of a "prolonged course of specific intellectual instruction."

The DPMA, of course, has two tests for professionalism — the Certificate in Data Processing for managers, plus the citation for a Certified Business Programmer — but was not represented at those hearings.

## This is our family's "Tom Swift"— for good reason.

This offspring of our original Extended Core Memory has a right to be called "Tom Swift" because it's fast and innovative... 2.5  $\mu$ sec speed on a 360 Model 50—almost the speed of main-frame memory.

The new ECM-50 at 2.5  $\mu$ sec permits replacement of IBM main-frame memory with a significant increase in core—1 to 8 million bytes—with no software changes. Increased throughput, of course. It's an economical break of previous main-frame capacity barriers. The original version is still available at 4.0  $\mu$ sec for the IBM Model 50.

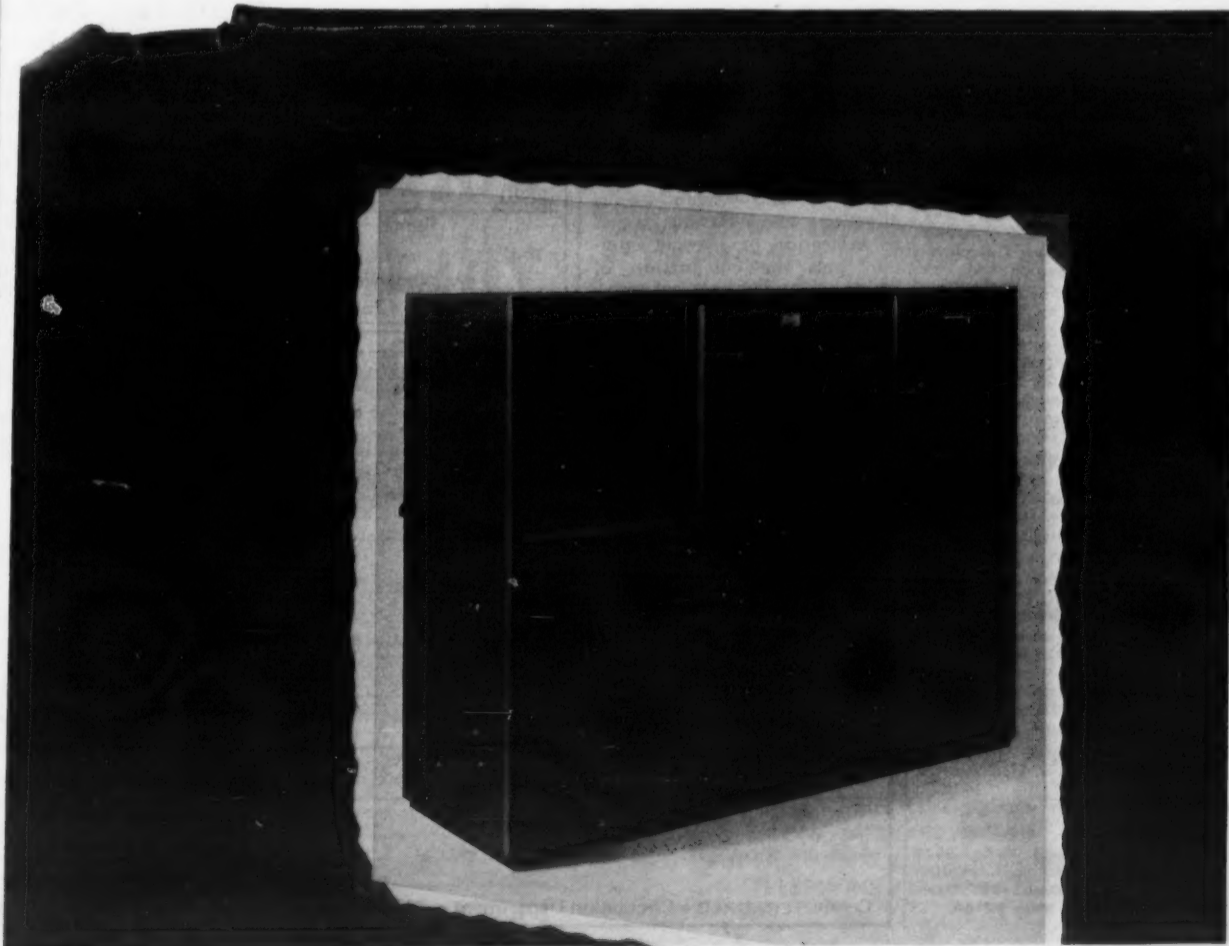
Other Ampex ECM's offer 1.8  $\mu$ sec speed for IBM's 65, 67 and 75 models, even faster with interleaving.

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# Purchase of Centralized Computer System Becomes Politically Embroiled in N.H.

By Ronald A. Frank  
CW Technical News Editor

CONCORD, N.H. — The proposed purchase of a centralized data processing system for state government operations has become embroiled in politics here.

At issue is a Honeywell Series 6000 system which would be used to set up a statewide criminal justice network and administer the state's welfare, liquor, insurance and other operations.

According to Meldrim Thompson, former candidate for governor, the urgency to commit the state to a new computer system does not exist because adequate time is available on existing state-operated systems.

Three state organizations, the Highway Department, Depart-

ment of Employment Security, and the University of New Hampshire presently have data processing installations.

The Department of Data Processing is already using about "a shift and a half" of the Highway Department's Spectra 70/45, according to Richard Hawes, N.H. director of data processing.

Thompson charged the state Data Processing Commission, headed by Senate President John R. Bradshaw, had entered into "negotiations" concerning the purchase "the legality of which is under question."

The negotiations for the purchase of the system followed competitive bids May 3 from major mainframe suppliers, according to Richard Peale, the

state purchasing officer. Peale said bids were submitted by seven suppliers in response to specifications issued on April 19.

The next step in the state authorization procedure will apparently come on Aug. 11 when the Governor's Council receives the recommendation from the Data Processing Commission to purchase the Honeywell system.

## IBM Prices

(Continued from Page 1)

The following is a list of models affected by IBM's most recent price changes and the average change — or range of averages — users can expect.

Model	Changes
360/30 CPU	Rental +4% Maintenance +8%
40	
50	
65	
67	
75	Rental +8% Purchase +8%
370/135 CPU	
145	
155	
165	
2880	Rental +3% to +8%
3046	
3066	
3067	
3/10 (5410)	
5203	Rental +6% Purchase +6%
5424	
5444	
5471	
5475	
5486	Maintenance +10% to +25%
2520	
2540	
2560	
2501	
2740	Maintenance -10% to -25%
2741	
1052	
1053	
1402	
2301	Rental +3% to +8% Maintenance +10% to +25%
2303	
2365	
2820	
1442	

## 'Hopper Award' at ACM '71

(Continued from Page 1)

E. Knuth, of Stanford University.

In nominating Knuth for writing volume one of *The Art of Computer Programming*, his boss, George E. Forsythe, said, "Knuth simply stands 10 feet tall in the world of computing (instead of his actual mere 6 feet 5)."

Forsythe, chairman of Stan-

ford's computer science department, said the 634-page work "lays the groundwork for a discipline of computer science."

Members of the Eniac team expected to share commemorative events at ACM '71 include Cmdr. Hopper, and J. Presper Eckert, Jr. and Dr. John W. Mauchly, who left the University of Pennsylvania several years ago to form their own company.

Also invited was the head of the team, Dr. John G. Brainerd, the only person to stay at the university's Moore School of Engineering after completion of the Eniac project. Brainerd has recently retired, and declined the invitation, ACM said.

The medical-educational flavor of the public service exhibits [CW, July 28] may have been provided by a combination of several factors, according to conference Chairman Al Hawkes.

He noted there are at least eight medical schools or colleges in the vicinity, and many members of planning committees were members of special interest groups or committees concerned with educational or medical applications of computers.

The response to the call for papers was also weighted in this direction, which Hawkes saw as an indication of growing interest — plus the culmination of government research spending — in these disciplines.

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## News Wrapup

### IBM-Funded Technology Study Killed

CAMBRIDGE, Mass. — Harvard and MIT have killed their joint \$5 million inquiry into the impact of technology on society. Apparently IBM found the program too academic, Harvard found it not academic enough, and outsiders found it irrelevant.

The 10-year program began in 1964 with \$5 million in IBM money. After a periodic review last year, IBM indicated it had lost interest in the program, and told Harvard to use the remaining \$2 million for projects in the general field of technology and society. Harvard could have used the money to continue the program, but chose to channel the funds into regular academic departments.

### Ohio OCR Use Cuts Job Time, Saves Money

COLUMBUS, Ohio — The state's Department of Motor Vehicles (DMV) has completed updating its license plate file, numbering some five million transactions, and did the job in 30 days instead of the nine months it took to do it manually last year.

Tim Terry, project manager for DMV, said the quick conversion was accomplished through the use of optical scanning, which also saved taxpayers \$200,000. A rejection rate of 32%, which he called "excessively high," may be reduced by eliminating some of the 31 different type styles which the scanner is capable of reading.

The manufacturer, Recognition Equipment Inc., noted the equipment performed within contract specifications, and said reprocessing of most rejects is a relatively cheap procedure.

### University Asked to Halt DP Weapons Work

IOWA CITY, Iowa — The University of Iowa computer center should stop selling computer time to the Army for weapons research, State Rep. William Gluba declared.

"It is not the business of higher education and the university to assist in research and development of new and more effective ways to kill people," he said. The school's Board of Regents will consider the issue at its Aug. 12 meeting.

Army Weapons Command uses the 360/65 time bought from the university for engineering design for conventional weapons, as well as for battlefield simulations.

### Downed OTB System Relieved by Alternate

NEW YORK — One Off-Track Betting computer system crashed just as an alternate system began operation. OTB's main system, designed by Computer Sciences Corp., began operation June 15 and crashed July 21; it remained down late last week.

The alternate system, Control Data's Ticketron, began operation last week in one betting shop and will be expanded to others. All other shops were using a manual system.

According to Computer Sciences, the problem is in the software rather than the hardware, and has not been isolated. The difficulty showed up when the machines that issue betting tickets sporadically failed to work.

### Firm Taps Data Banked Employees' Skills

PORTLAND, Ore. — A local firm has been able to fill new jobs with its employees, with the help of its computer. By searching its data bank containing the skills and hobbies of its saw chain and construction tools division employees, Omark Industries found it already had people to fill the positions of industrial nurse and advertising coordinator for layouts.

The company's employment rolls also include a glass blower, a clergyman, two gambling dealers, an artist's model and an aerial photographer, among others. "We haven't been able to use many of the odd assortment of skills we have on our payroll," noted Roger Wagner, director of industrial relations, "but it pays off in other ways."

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07 Consultants/DP Services	07 Sales/Marketing
08 Business Services (except DP)	08 Librarian/Educator
09 Education/Medical/Legal	09 Other:
10 Government/Military	
12 Communications/Printing/Publishing	
13 Other:	

# 250 Attend Visually Impaired Data Processors Meet

MILWAUKEE, Wisc. — Braille translating equipment used for coding, cross-checking program documentations, debugging, and keypunching operations was displayed for some 250 attendees of the second conference of

Visually Impaired Data Processors International (Vidpi) last week.

The attendance figure, more than double last year's meeting, reflected a "more comprehensive" universe of potential em-

ployers for visually impaired people, according to conference chairman Richard Snipas.

While most of the equipment shown was in the manufacturing or prototype stages, and little is in actual use, Snipas sees a growing interest in hiring qualified handicapped programmers or terminal operators. The generally bleak national employment picture, however, affects these people even worse, he added.

Snipas indicated some schools have even stopped training blind EDP people because of failure to

place these students after educating them.

Nonetheless, the hardware developments continue, and the emphasis at this year's show appeared to be in Braille attachments for standard terminals.

Vidpi plans to seek federal assistance to procure such terminal attachments for members, hoping this equipment would assure a visually impaired person of obtaining a job. An official of Health, Education and Welfare was present to discuss grants of this type, but no conclusion on federal policy was disclosed.

While the emphasis last year was on unemployment for programmers, Snipas said this year equipment is being devised that could enhance members' employment capabilities to any computer user with a terminal device.

"Teleprocessing is the future for blind programmers," he concluded, "not necessarily systems analysis or design."

Instead of staying a Cobol programmer, the equipment shown at Vidpi '71 might also assist a person to become a more specialized programmer.

## Mass Retailers' Problems Relate To Their Growing Sophistication

NEW YORK — Are self-service mass retailers getting their money's worth from EDP? The extent to which this industry utilizes the computer — its uses, accomplishments, failings and horizons yet to be explored was revealed in a study recently released by the Mass Retailing Institute (MRI).

Following are some of their conclusions:

- A significant number of users are hampered by deficiencies in communications between management and the data processing effort.

- There has been a major increase in the application of EDP to certain accounting operations of self-service mass retailers. Growth exists, though not nearly as measurable, in the areas of buying and merchandising. And a small but growing interest is evident in the use of EDP in the management science areas such as personnel analysis, sales forecasting and other more sophisticated techniques.

- Management science and merchandising areas require a greater degree of coordination and company-wide understanding than the already successful accounting operations.

The report is based on an MRI study of more than 3,300 stores and 800 leased departments.

## Part Time Help For Small Users

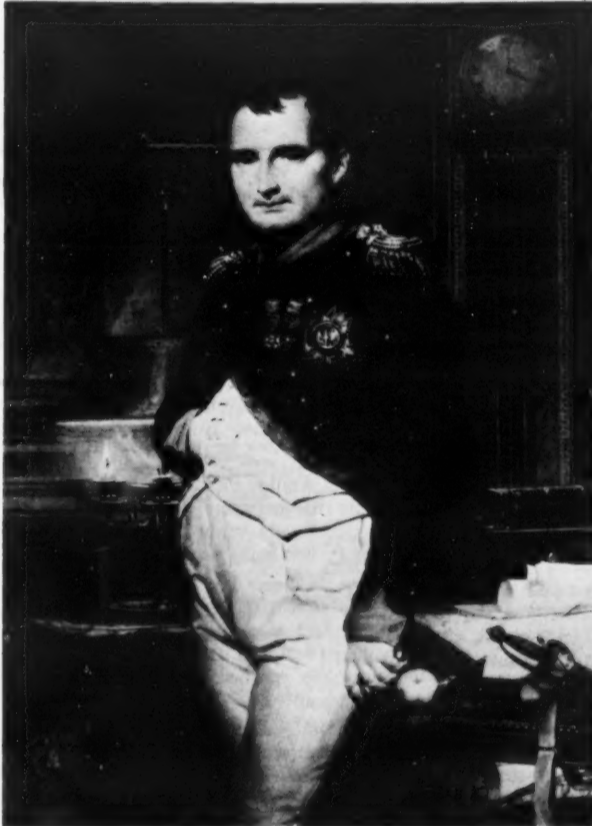
SKOKIE, Ill. — A "part-time decision maker" may well be the answer to problems of inefficiency and lack of comprehension caused by the mystique of data processing. All organizations process data... manually, on their own in-house computer installation, or at a service bureau. Executive time sharing could well be the missing link. So says Mel Jacobs, president of Mel Jacobs & Associates, Inc., here.

Jacobs believes smaller users simply cannot afford the cost of a top level computer executive who is knowledgeable enough to manage their data processing requirements efficiently.

Lack of intelligent data processing management is the key loss factor among small users. Jacobs and his firm propose to supply this management on a part-time basis — Executive Time Sharing.

According to Jacobs, "what top management of medium and small users need is a computer executive on his side to deal with the processing unit, whether it be in-house or at a service bureau... to communicate upward to management and downward within the organization. This could well include areas such as financial and equipment planning, education, procedure development and general overall management control."

Copies of the 51-page report are available to MRI members at \$20, to non-members at \$50 from Mass Retailing, 570 Seventh Ave., New York, 10018.



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N

## Editorial

### Message to Congress

Within a few years, computers are going to be running this country. No, they're not going to replace the legislators. But the day-to-day operation of government and business at a reasonable cost already is impossible without the help of computers. And the reliance on computers must increase or the nation will go bankrupt.

But computers, unlike automobiles, don't roll out of the factory ready to go to work. Computers do their jobs efficiently only when experienced systems analysts and programmers "tell" them how.

And right now many of these experienced people are out of work. They will be lost to other vocations if they can't find work soon.

So, unless you want the whole country run at the level of efficiency displayed by that computer that keeps dunning you for those 17 refrigerators you "bought," you had better find a way to keep these experienced people employed until the recession ends.



## Letters to the Editor

### Reader Suggests Nasa Data Might Be 'Out of Kilter'

The article by Phyllis Huggins headlined "Astrology Charts May Be 12 Degrees Out of Kilter" is truly a shocking revelation for many people [CW, July 21].

Jerry Koory was quoted as saying that evidence based on data of planetary positions from Nasa led him to believe that ephemerides (tables of planetary positions used by astrologers) were in error by as much as 12 degrees for some planets.

However, wouldn't fairness dictate that the Nasa data on planetary positions also be held suspect? Can we be sure that Nasa space probes are in fact being launched to the proper planets?

For some time my company has been making computer calculations of planetary positions for astrologers. Our computer programs have been developed from the equations of celestial mechanics.

Our calculations are essentially those used to generate the tables in *The American Ephemeris and Nautical Almanac* published jointly by the U.S. Naval Observatory and Her Majesty's Nautical Almanac Office, Royal Greenwich Observatory.

Our calculations of planetary positions do not differ from this standard work by more than 6 seconds (this is a large angle for the astronomer) and most ephemerides used by astrologers are within a minute or two of our calculations.

In fact some ephemerides used by astrologers use the entries, after a geometric transformation, directly from *The American Ephemeris and Nautical Almanac*.

This clearly demonstrates the accuracy of astrological source data and astrologers can breathe easier.

But what of Nasa? Does this mean its data is in error by 12 degrees? And as taxpayers, don't we have the right to know when Nasa plans a launch towards Libra it's not straying off course toward Scorpio instead?

Horace A. Howe  
President

Astro Numeric Service  
El Cerrito, Calif.

### Readers Should Know 'Key' 155 Assumptions: Taylor

I am glad Noel wants your readers to know about the different assumptions

that were used to calculate the 1970 version of the Model 155 instruction times, as opposed to the slower 1971 list [CW, July 28]. However, as he did not explain the key assumptions, your readers will need more data to understand the situation.

The key assumptions deal with the use of the fast Model 155 buffer, which stands in front of the quite slow (2.2  $\mu$ sec cycle time) main storage.

The way the 155 works is when it wants a word from memory it looks first into the buffer, and, if unsuccessful in finding it there, holds up execution of the instruction until it is brought down from main storage.

This can happen up to three times during the execution of a single instruction (once for the instruction itself, and once for each of two operands), and each time this happens the Model 155 is delayed for about the length of three average straight instructions.

For instance, in the only fully commercial work stream that IBM provides data on, these delays were involved in 13% of all instruction and operand fetches. The total delay probably amounts to an additional 40%, on top of the total straight instruction time.

Which makes the effect of this design-complexity a most significant part of real-life instruction times.

But IBM totally ignored this in its 1970 assumptions [CW, July 14]. It preferred to use (for the initial marketing campaign) timings which assumed that the 155 never had to go to main storage for its instructions! Nor for its operands!

Which was clearly an unfair assumption.

In 1970, when the Model 155 was introduced, few prospects from Model 40, 50 or 65 installations would have had the technical background to be able to estimate the impact of these assumptions on the timings. Not that this really mattered, because such prospective buyers would not normally have had access to the assumptions at all, never mind be able to evaluate them.

The Beckerleg memo did not authorize quotations of assumptions being given to customers, only of the instruction times that had been calculated on these invalid premises. And IBM flatly banned the release of the document including the assumptions.

Although, as Noel says, the 155 was available on the announcement day, so that the data on instruction times could

easily have been obtained at that time, this blackout was maintained right up until May, 1971, when IBM put out the official times.

These, incidentally, had more realistic assumptions that between 10% to 30% of all instructions were being delayed while main memory was being accessed.

Now your readers can appreciate the assumptions that Noel wanted them to understand, and also the way IBM was able to claim faster times than the user would normally receive, yet avoid them being written into the fixed price contract.

And that is the concealed price rise which I queried in my column — the difference between what a user reasonably expected and what IBM is apparently delivering. Noticeably, IBM's vice-president of DP marketing did not deny this price rise, and I wish that he would explain it.

Alan Taylor, CDP

### Book Reviewed, Not Basic

I'm sorry that I offended LeRoy Finkel [Letters to the Editor, June 2] with my review of *Basic Basic*. The point I was trying to make was that the title of the book did not seem to square with its contents. But I am really sorry if it put down high school students, it wasn't intended that way.

I have looked at many of the new extensions of Basic. It always was a powerful language and is now even more so.

His suggestion of exterminating Fortran is a hopeless task, and as long as it is widely used we are under an obligation to teach it.

Finally, I would like to remind Finkel that I was reviewing a book, not Basic.

Paul F. Hultquist

Colorado Springs, Colo

### Cobol Sort Feature

#### Leads to Trouble Too

Recent Taylor Reports on Sort timings [CW, May 12, June 16] point up some inefficiencies an IBM user can incur from his choice of a sort program. The availability of the Cobol Sort Feature now gives the user a further opportunity of sorting less than optimally.

In the IBM DOS implementation the

sort, when invoked as part of a Cobol program, is called into a (minimum 22K) separate area of that program's partition. Used this way the sort would have available only a fraction of the total partition size.

In the case of IBM's Sort 483, if the sort program is restricted to (say 22K) by use via Cobol then, with disk work files, a sort can easily take twice as long when compared to its time if executed separately in a full partition of perhaps 64K.

Use of the Cobol Sort Feature is certainly justified for small volume sorts occurring in the middle of a logical program. However installations should probably avoid the feature for major sorts at the beginning or end of a program.

D.S. Carn

Systems Department

Brown Brothers Harriman  
New York, N.Y.

### IBM The Only Bad Guy?

From reading Alan Taylor's column it appears that he has a personal vendetta against IBM. Every other article he writes is critical of the company. This is not to suggest that IBM is beyond criticism.

However, I have never seen Taylor make any derogatory remarks about any of the other computer mainframe manufacturers. Why hasn't he ever written about the failure of the Burroughs 6500 to meet specifications even though it was announced more than four years ago.

Why hasn't he even discussed the problems Univac has had with the Exec 8 software. It would not be difficult to find equipment problems at Honeywell, Control Data, RCA, etc.

Is IBM the only one with dirty linen? I don't call this balanced reporting.

James Hangen

New York

Taylor and CW have, at one time or another, cited all of the mainframe companies for shortcomings. But IBM, because of its size and its number of customers, creates by far the biggest waves. Ed.

Computerworld welcomes comments from its readers. Preference will be given to letters of 150 words or less. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

## One-Sided 'Spectrum' of Work Streams

# Are IBM's 50/155 Throughput Comparisons Polluted?

Computers are not like human beings. Computers being data processors and digital ones at that, will only accept as input that which programs permit, and will then rely on the provided input being correct to process.

A human being, by contrast, will accept data that appears to have some relationship to a situation and proceeds to process it. This is different.

This information processing — as opposed to data processing — is, of course, one of humanity's greater strengths.

But it can also be a serious weakness. This is because irrelevant data, provided with the appropriate background, can not merely hide the fact that the relevant data has not been made available, but even make people believe that they have the real information!

When this occurs — when irrelevant data is taken for real data — then data pollution has occurred.

What seems to me to be a case of such data pollution comes up with regard to the performance and the throughput comparisons provided by IBM for its Model 50 customers who are considering the 155.

In a letter signed, "Very Truly Yours" an IBM Poughkeepsie system staff provides throughput comparisons showing, on the surface, that the 155 is much more powerful than the 50.

The letter is directed to customers and is to be read immediately after they have seen a slide presentation claiming that the 155 is the successor to the Model 40s and 50s.

It appears to be a very cautious, responsible letter. It advises the people that there are all sorts of conditions which may

occur, which will change throughput performances, but goes on to say the IBM scientists believe they have accurately selected work streams after examining a wide spectrum of them.

The letter also claims that with similar configurations similar results can be expected.

### Relevance Not Mentioned

It looks to be a really scientific drawn-up document. As a matter of fact it had convinced me when I first read it. But looking back I found there was one little vital proviso, that was not mentioned.

It never even suggested that the programs making up the work streams were at all suitable for either the Model 40 or the Model 50!

And those "responsible" cautions against misinterpretation served to hide this vital omission, like a conjurers' diverting patter.

Having noticed this failure to mention relevance, I then turned to the attachment which actually gave the figures to see if the work streams were relevant for Model 40 or Model 50 users' normal situations.

IBM listed one commercial job stream, two science/commercial job streams, and three scientific job streams. It also gave configuration details saying that the peripherals themselves were stated to be the same, the amount of memory was either 512K, or twice that amount — 1,024K.

The number of Model 50s that had that amount of memory from IBM is pretty low. So the configurations were very unrepresentative, for a start.

Data pollution was now becoming pretty certain, but still the job stream might be relevant. So I went further.

### Finding if Job Stream Relevant

It occurred to me that I was able to tell a certain amount about what the work streams were, as I knew that programs cannot go faster than the slowest of peripherals — not even in multiprogramming!

If a program which was origin-

Where IBM's Claims Come From						
Case No.	IBM Quoted Timings (min)		Maximum Peripheral Time (Unchanged) (min)	Model 50 Processor/Peripheral Balance Ratio	Minimum % Processor Out of Balance With Peripherals	IBM Claimed Throughput Improvement
	Model 50	Model 155				
A	100	34	34	100/34	190%	191%
B	108	40	40	108/40	170%	170%
C	126	81	81	126/81	56%	56%
D	62	20	20	62/20	210%	212%
E	82	26	26	82/26	215%	215%
F	105	41	41	105/41	156%	191%
G	115	46	46	115/46	150%	170%
H	154	107	107	154/107	44%	56%

Chart shows all the Model 50 and corresponding Model 155 times where the same peripherals and degree of multiprogramming (if any) was used in the referenced "Summary of IBM Performance Studies." The Out-of-Balance ratio is computed by comparing the time beyond peripheral needs that was used on the Model 50, to the peripheral time necessary, and as such may well be understated.

In general the IBM-claimed throughput performance improvements simply reflect the out-of-balance characteristics involved in running

basically unsuitable programs on the Model 50. (Cases F, G, and H, where the IBM claim is higher, simply arise because IBM's format allowed these figures to be confused for related but different cases shown here under A, B, and C — and instead of providing for averaging the two results, IBM simply selected to give the most favorable (to it) and not mention the difference.)

Using this technique with other programs that would have been even more unbalanced on Model 50s could, of course, have been used to "prove" even higher improvements.

ally operating in 100 minutes starts to be able to operate, with the same peripherals, in 40 minutes, then this indicates none of the peripherals was working more than 40 out of the original 100 minutes.

That is to say it indicates that the central processor was working 2-1/2 times more than any peripheral.

IBM's figures, showing that the 155, with its faster processor, could substantially out-perform the Model 50 with the same peripherals, indicated that each of the job streams, when run on Model 50s, was very dominated by central processor operations.

So highly so that if these work streams had really been running on installed Model 50s, the user's peripherals would have been standing idle for anything up to two-thirds of the time!

Such Model 50 work streams could be relevant only if such central processor dominance was normally found in Model 50 installations — which it is not. The work streams were not relevant.

The figures are just a lot of data pollution.

(In point of fact the work streams were much more relevant to a Model 65 environment, or even a Model 75 one.)

### More Questions

All of which brings up more questions about the capabilities of both the 370, and about the capabilities of IBM's scientist staffs.

This is not the first time that they have provided invalid information. There was the memorable time with the Model 67 when they were claiming eight times improvement over the 7094.

The basis of the claim turned out that they had picked a group of Fortran programs which were so short that a system spent 80% of its time running up and down the systems tape trying to find the programs! Based on an assumption that this would not occur on the Model 67, this

made Model 67 eight times faster!

And there are other skeletons around also.

### User's Problems

From the all-important user's point of view however, the thing to realize is that IBM simply does not seem to have learned that data from irrelevant programs is polluted data or does not care if it has learned.

So, from the user's point of

view, the thing to do is practically to ignore IBM's claims, and, if these are the best reasons for moving up to the 370/155 (and up to its dollar costs), then they might as well ignore the 155.

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### The Taylor Report

By Alan Taylor, CDP



## Letters to the Editor

### CDP Seen as CPA Equal

I believe that the Ad Hoc Association of CDP Holders, as computer professionals, should take immediate steps to see that the CDP program rapidly becomes the equivalent of the accounting profession's CPA.

The current need for a meaningful CDP society is much greater than the need that existed when the society of CPAs was initially formed. It took the accounting profession several thousand years to get their society — let's show them how it is done in the computer profession in less than 25 years.

Putting teeth into a society of CDPs is only the first step, however. There is an equal need to establish the universal standards for programmers and systems people if we are to present a

professional posture to top executives throughout the world.

Fred E. Hammer, CDP  
Manager, Information Services  
Star Manufacturing Co.  
Oklahoma City, Okla.

### Air Mail-Only Address?

In the June 30 issue, in the Letters to the Editor section under "Where is DYL-250?" you said Dylakor's address is 16225 Saticoy St.

It is, in reality, 16625 Saticoy St.

The Post Office informs us that the incorrect address is somewhere in the middle of the North-South runway of Van Nuys Airport and hence, is undeliverable or very risky at best.

James A. Case  
President  
Dylakor Computer Systems, Inc.  
Van Nuys, Calif.

P.O. Box 998  
Building 941  
Poughkeepsie, New York 12603  
914/455-8985

Headquarters Field Systems Center

AUGUST 5, 1970

MR IBM CUSTOMER  
S/370 DEMONSTRATION  
POUGHKEEPSIE, N.Y.

DEAR MR CUSTOMER

WELCOME TO THE IBM HEADQUARTERS FIELD SYSTEMS CENTER AT POUGHKEEPSIE, NEW YORK.

YOU HAVE JUST SEEN A DEMONSTRATION OF IBM'S NEWEST COMPUTER, THE SYSTEM/370 MODEL 155 RUNNING UNDER THE OPERATING SYSTEM, MVT OPTION.

ATTACHED IS A SUMMARY OF OUR PERFORMANCE STUDIES COMPARING THE SYSTEM/370 MODEL 155 C.P.U. WITH A SYSTEM/360 MODEL 50 C.P.U. THESE STUDIES WERE DESCRIBED IN OUR SLIDE PRESENTATION. WE WOULD LIKE TO EMPHASIZE THAT SYSTEM AND PROCESSOR THROUGHPUT WILL VARY IN ANY COMPUTER INSTALLATION, DEPENDING ON INPUT/OUTPUT DEVICES, JOB MIX, APPLICATION PROGRAMS, AND MANY OTHER FACTORS. WE FEEL THAT WE HAVE ACCURATELY MEASURED A LARGE SPECTRUM OF JOBSTREAMS, BUT SIMILAR RESULTS WILL REQUIRE SIMILAR CONFIGURATIONS. THROUGHPUT INCREASES IN YOUR INSTALLATION WILL VARY DEPENDING ON THESE FACTORS.

THANK YOU FOR VISITING WITH US TODAY. WE WILL BE HAPPY TO ANSWER ANY QUESTIONS THAT YOU MIGHT HAVE CONCERNING IBM'S NEW SYSTEM/370.

VERY TRULY YOURS,

THE POUGHKEEPSIE HQFSC STAFF

Letter signed "Very truly Yours, The Poughkeepsie HQFSC Staff" enclosing a summary of their performance studies comparing Model 50 and 155. Note they claim to have accurately measured a large spectrum of work streams, and that similar configurations will be required for similar results — but make no mention of the fact that all the work streams included in the summary are hopelessly out of balance on the Model 50, with the peripherals left idle most of the time.

## IEEE Revives Canceled NEC

CHICAGO — In that race between trade shows and the economy, the National Electronics Conference (NEC/71) will run after all, but with a new "jockey."

The Institute of Electrical and Electronics engineers (IEEE) will pick up the technical program originally designed for NEC/71, which has been canceled (CW, July 7).

Calling their version the "Fall Electronics Conference 1971," IEEE will retain almost all of the people involved with the technical portion of the defunct conference, and will preserve the NEC dates of Oct. 18-20.

Site for FEC/71 will be the Pick Congress Hotel here.

Registration chairman is James E. Ricker, c/o Illinois Bell Telephone Co., 225 W. Randolph St., HQ 11 B, 50505.

## JCCs to Stress Applications: Uncapher

# Computers to Fight 'National Problems'

By Edward J. Bride

CW Staff Writer

CAMBRIDGE, Mass. — Among the "variety of national problems" facing this country today, the computer should help solve or ease the difficulties in air traffic control, health, and transportation.

Aside from welfare crises and ecology, the solution to the above three problems will be a "priority item" for computer professionals in the near future, according to the senior man in American computer societies.

Keith Uncapher, president of the American Federation of Information Processing Societies (Afips), said associations of computer professionals are becoming more applications-oriented, and this interest in various uses of computers is spreading to technical conferences.

Afips sponsors the semi-annual joint

computer conferences, and one of the first items on the new president's agenda is a "critical look at the JCCs," he said in a recent interview.

While the "joints" are doing "better than most technical conferences," Uncapher commented, "they may need to be more aligned with applications, rather than with technology."

Technical developments always receive prominence at the conferences, but computer professionals may turn their attentions to significant applications, especially now that the new families of machines have been unveiled.

It is "a little late" to plan changes for the Fall conference in Las Vegas next November, Uncapher noted; but he does believe exhibitors will take it upon themselves to show this orientation in future meetings.

The Technical Program, which has traditionally been an arena for new design developments, will also provide an opportunity to discuss new applications, he noted.

Many other professional groups along industry lines, such as bankers or the power industry, conduct their own conferences to discuss computer applications.

This will not detract from Afips' effectiveness, Uncapher said, since the JCCs mix applications topics with the new technical advancements, exhibits, and social implications.

The industry conferences cannot deal with computerization on such a broad scale, he noted, adding professionals can benefit from both types of meetings.

### 'Information Source'

As far as other Afips projects are concerned, the new president sees the federation acting as an "information source" for government and the public, especially since so many federal and state agencies are concerned with computer usage.

Uncapher is assistant head of the computer science department at the Rand Corp. whose close affiliation with the government will embellish Uncapher's — and therefore Afips' — role as the provider of technical information.

The federation also has active committees investigating the social implications of computers, communications needs of computer users, and professional standards for EDP people.

These committees, and the "national problems" facing the general public, will provide the stimulus for idea interchange at the Fall Joint Computer Conference, whose theme is "Computers and the Quality of Life."

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Computerworld has just published the definitive book on replacement of keypunch equipment.

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The Keypunch Replacement Handbook gives you:

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- equipment analysis
- instructions on how to properly analyze your current keypunch department facilities and needs
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- easy-to-use charts, graphs, and formulas that will greatly simplify your decision making
- comparative pricing for each group of like equipment (in three different size configurations)
- case histories of user experiences over a wide range of business activities

And, in addition to these features you'll find a brief, but complete history of the keypunch, an appendix that gives technical background material (written in layman terms), illustrations, and a complete index.

If you are considering the replacement of any keypunch equipment, you will find this book invaluable.

To order your personalized copy of our new Keypunch Replacement Handbook, fill out the attached coupon and send it along. We'll send you, by return mail, your handbook and a complete set of worksheets.

## French Seek Status

CW European Bureau

PARIS — Representatives of 30,000 French programmers recently held their first formal congress here.

They claimed they are not recognized by the "authorities" who say they do not belong to any trade or profession, and threatened "militant action" if the claim is not recognized.

## Calendar

Aug. 24-26, San Francisco — Wescon Convention. Contact: Raquel Howard, Wescon, 3600 Wilshire Blvd., Los Angeles, 90010.

Aug. 25-27, Montreal — Fifth Annual Magen (Matrix Generation) User Group Meeting and Mathematical Programming Seminar. Contact: Haverly Systems Inc., 4 Second Ave., Denville, N.J. 07834.

Sept. 2-3, Washington, D.C. — Quarterly Meeting of the Formatted File Systems Commercial Users Group. Contact: Ralph S. Greer, FFS-CUG Secretary, Technics Corp., Suite 456, 414 Hungerford Drive, Rockville, Md. 20850.

Sept. 7-10, Loughborough, England — IEEE 1971 Conference on Displays. Contact: The Institute of Electrical and Electronics Engineers, Inc., 345 East 47th St., New York, 10017.

Sept. 8-10, Lake Arrowhead, Calif. — Workshop on Computer Networks sponsored by the West Coast Committee of the IEEE Computer Society. Contact: Prof. David J. Farber, University of California, Information and Computer Science Dept., Irvine, Calif., 92664.

Sept. 9-10, Denver — Society for MIS Annual Conference. Contact: Gerald M. Hoffman, SMIS, One First National Plaza, Chicago, 60670.

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COMPUTERWORLD

## societies/user groups

### Wheeler Tapped for FJCC; Other Groups Fete DPs

LAS VEGAS — Ralph R. Wheeler has been appointed chairman of the 1971 Fall Joint Computer Conference, to be held here Nov. 16-18.

Wheeler is supervisor of hybrid computing for Lockheed Missiles and Space Co., Sunnyvale, Calif., and has served as his company's supervisor of simulation support services to Nasa's Manned Spacecraft Center.

"In keeping with our theme of 'computers and the quality of life,' we have solicited papers... relating to the use of computer technology in meeting man's most pressing needs," Wheeler commented.

\*\*\*

IEEE has awarded the grade of Fellow to officials of Computer Sciences Corp. and Calcomp.

Dr. Alvin E. Nashman, vice-president of CSC, was cited for "contributions and leadership in the development of communications and geodetic satellite systems."

Harry L. Larson, director of planning at Calcomp, was feted for "contributions to the applications and social implications

### ACM Thanks Firm For DP File Aid

LOS ANGELES — The local ACM chapter, largest in the U.S., has computerized its membership lists, mailing lists, records and reports, with free assistance from a software company which specializes in file management systems.

In turn, the chapter awarded Informatics Inc. a certificate of appreciation. The company donated the use of its Mark IV System, and provided systems analysis and programming to automate the chapter's records.

The old manual system became inaccurate and burdensome when local membership rose above 1,000.

### Microfilm Meet Bigger in '72

NEW YORK — Exhibit space for next year's microfilm convention is nearly sold out, according to Jack M. Sauter, conference chairman for the 1972 meeting of the National Microfilm Association.

Of the exhibit space reserved in the Coliseum, almost 90% has been committed, adding up to one-third more space than in the recent meeting in Washington, Sauter reported.

### CW Namedropper?

PARK RIDGE, Ill. — The name of Charles Loeber, CDP, was omitted from our list [CW, June 30] of new DPMA vice-presidents. Loeber is employed by General Electric, Schenectady, N.Y.

of computer systems."

\*\*\*

Charles Munn has been elected president of the Bank Automation Association of the Delaware Valley. The organization brings together experts in bank data processing, and was founded in 1940.

\*\*\*

John Doukouskian has been elected president of the Audit-Thru Users Group.

## Users Join Designers for IEEE

By a CW Staff Writer

BOSTON — "Moon man" Edgar Mitchell and "Avis man" Robert C. Townsend will provide a more general user's outlook for this year's IEEE Computer Society Conference, to be held here Sept. 22-24.

The conference is usually considered strictly a designer's show, but this fifth annual meeting, the first since the organization's Computer Group re-formed as the Computer Society, will be about evenly divided between design considerations and usage or management topics.

Astronaut Mitchell, a Navy Captain, walked on the moon as part of his first space journey. He will deliver the keynote address at the affair, and will concern himself with "computers from the viewpoint of a user," according to IEEE.

Townsend, who authored "Up the Organization" after upping the Avis car rental company to its renowned No. 2 position, is consultant to the Keydata Co. and CRM, and will be guest speaker at the luncheon.

Technical Program Chairman Norman Rasmussen said the evident slowdown in the computer

industry is "related to poorly cost-justified applications or systems," and that the papers for this meeting should "help remedy this situation."

The development and use of quantitative methods for designing and evaluating systems should help prevent recurrence of systems performing "less well than expected" or "costing more to implement than planned," he said.

Besides the purely technical presentations, there will be discussions of minicomputer applications, elimination of bottlenecks in computers, system measurement techniques, communications, applications of and experience with large memories, and a discussion of centralized/decentralized files.

Registration will cost \$55 for non-members, \$45 for members at the conference, with pre-registrants getting \$10 discounts. IEEE student members will be admitted free, non-members pay \$2.

Registration will also include attendance at the Nerem '71 conference in early November.

IEEE Computer Society Conference can be reached through General Delivery, Kendall Square Post Office, Cambridge, Mass. 02142.

Our BI 2600 works better and will last longer than any competitive mag tape unit made today.

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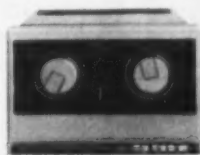
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can't cup your tapes.



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## DEC Opens T/S Centers

By a CW Staff Writer

MAYNARD, Mass. — Educational institutions can now teach programming to students on a time-shared basis, through local centers set up recently by DEC in Los Angeles, and Palo Alto, Calif.; Chicago; Minneapolis, Minn.; Washington, D.C.; and Waltham, and Maynard, Mass.

Each of the centers has an Edusystem 50 which is based on a PDP-8e and gives users access to such educational languages as Basic, Focal, Fortran IV, PAL-D, and a variety of editing aids.

Complete minicomputer systems, the Edusystems can also be used by teachers to develop computer-assisted instruction (CAI) courses, and by administrators for normal DP operations.

Non-profit organizations can also use the new centers, DEC said.

The Edusystem 50 configurations can support 16 terminals operating simultaneously.

Subscribers to the service have the option of applying a percentage of the monthly charge toward the purchase of a DEC computer, the company said. The basic charges are \$250/mo without terminal, or \$315/mo with terminal rental. The purchase option adds \$100/mo to these figures.

## International Education

# Canadian School Joins DTSS Net

By a CW Staff Writer

HANOVER, N.H. — The Dartmouth Time Sharing System (DTSS) has added the University of Montreal to its network of 50 U.S. educational institutions.

With the installation in July of three data lines between the Kiewit Computation Center here and the School of Business at the University of Montreal, the DTSS began a Canadian expansion that will ultimately serve educational, research, and government organizations.

Initial plans call for the installation of 18 time-shared teletype-writer channels throughout Canada, which eventually will link schools in British Columbia, the prairie provinces, Ontario, and

Quebec with Dartmouth.

When the Canadian educational network is fully configured it

The addition of the Canadian school is the first example of an international expansion by an educational timesharing network, according to Dr. Thomas E. Kurtz, Kiewit director.

DTSS facilities will be available to Canadian educational organizations through Joseph and Chambers Ltd., Place Bonaventure, Montreal, Canada.

## Education

will be allocated up to 10% of the storage available at Kiewit.

## Students Get Console Training To Avoid Unskilled Unemployment

MUSKEGON HEIGHTS, Mich. — Underprivileged high school graduates here are being given an intensive eight-week course in computer console operator training as part of a pilot program designed to keep them off the unemployment rolls.

The local school district is using federal and state funds to help black high school graduates compete with more skilled and experienced adults in the current job-scarce economy.

Under the program, 15 graduates selected from high school seniors not going on to college will be screened for participation in the console training course. If the project is successful, the students will become skilled employables by early fall.

The local school district has awarded a true performance contract based on per student cost for achieved accomplishment levels to Epstein & Sweeny Associates (ESA) Nyack, N.Y.

Under the program, the students will receive console training on a 360/30, with 10 hr/week hands-on operation. As part of the contract, ESA will not be paid unless each student can successfully operate the Model 30. In addition ESA must place each student at a DP installation to comply with the terms of the true performance contract.

The local Muskegon area currently has a 25% unemployment rate but many of the students will relocate, an ESA spokesman told CW.

Based on criteria supplied by the local school district and local data processing managers, the training program is one of the first to include a performance contract in DP education, according to ESA.

## Control Data releases new high-speed cartridge disk drive to OEM market

200 tracks per inch,  
100-million-bit storage

Cartridge disk drive shown with optional cabinet

Original equipment manufacturers now can take advantage of the fastest data access capabilities on the market. The new CDC cartridge disk drive has a 2400 RPM spindle speed . . . with 35 msec average access time.

### Unique options offer 100-million-bit storage

In addition to higher speeds, the new disk drive offers OEM storage capacities far surpassing anything available to them before. The standard 25-million-bit memory can be doubled with addition of an optional fixed disk. The resulting 50-million-bit total can again be doubled with 200 track per inch density — a new option only Control Data provides.

### Makes IBM 5440 performance available

Control Data specifically designed this random access memory device to work with either the CDC 847 cartridge or the IBM 5440 — giving OEM's what is widely recognized as the highest level of reliability on the market.

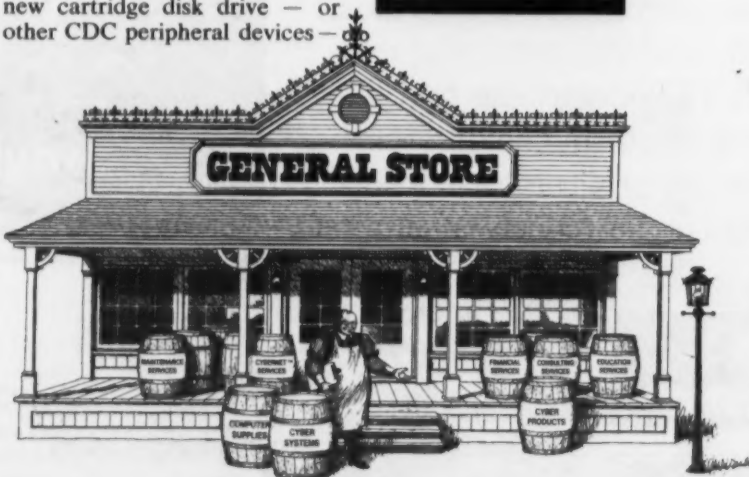
Interested manufacturers can obtain further information or arrange for a demonstration of the new cartridge disk drive — or other CDC peripheral devices —

by getting in touch with Control Data Peripheral Products Sales. For a copy of Control Data's full-line catalog of OEM peripheral products, write Dept. CW-84, P.O. Box 1980, Twin Cities Airport Station, MN 55111. Or call our HOT LINE collect:

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## Publisher Enters Timesharing Pact

BOSTON — Houghton Mifflin Co., education book publishers has entered into an agreement with Time Share Corp. of Hanover, N.H. to provide texts, workbooks, and other teaching aids for use in high school timesharing programs.

The publishers will provide supporting documents for use by the 40 secondary schools now operating on the Time Share educational system in the Northeast.

Under the agreement, curriculum materials developed by Houghton, Time Share, and participating schools will provide published timesharing aids in math, chemistry, physics, accounting, and the social sciences, according to a Time Share spokesman.

Although initially Houghton will publish workbooks to supplement courses in which students access the Time Share network, the agreement could result in textbooks specifically tailored for courses which require timesharing from a classroom terminal, the spokesman said.

### DP to Report on Physical Fitness

ST. JOSEPH, Mich. — Students at Lake Michigan College may learn from a print-out how their physical fitness compares with that of other students. Peter Banta, physical education instructor, plans to run data from a five-part test through a computer. The results will rate students and pinpoint weak areas.

August 4, 1971

Page 11

## Bits & Pieces

### Enhancements Given 135 Include 20 Compatibility

WHITE PLAINS, N.Y. — The 370/135 has received four enhancements, bringing it in line with the teleprocessing orientation of the 370 series, and using more of the capabilities of the floppy disk. The number of subchannels on the byte multiplexer has been increased from 64 to 128 or 256 at the user's option; the integrated file adapter will now handle up to eight 2314s, while previously the maximum number was five.

The 2711 line adapter unit can now be attached directly to the integrated communications adapter without going through any other hardware and the 125 will now run most 360/20 programs under DOS. There are no additional charges for these enhancements.

### Qantel Adds Disk

HAYWARD, Calif. — Qantel has added a 2311-like disk drive to the peripherals for its small processor-intelligent terminal. The 7.6 Mbyte unit costs \$12,000, and the controller costs \$2,400. The disk enables users to maintain a 20,000 item inventory or do large-scale pre- and post-transmission buffering, according to Qantel, which can be reached through P.O. Box 3517, 94544.

### Delta Lowers Prices

CORNWELLS HEIGHTS, Pa. — On the terminal front, Delta Data Systems has chopped the price of its four-color CRT by about a third from \$10,500 to \$6,200. Delta's Model 2000 comes with display, keyboard, and control electronics that permit editing and allow blinking characters. Characters can be displayed in green, red, yellow and blue. Delta is in the Woodhaven Industrial Park, 19020.

### X-Y Plotter Runs at 30 char/sec

DANBURY, Conn. — The TSP-300 remote plotting system from Time Share Peripherals (Miry Brook Road, 06810) drives an 11- by 17 in. X-Y recorder at 450- to 600 pen movements a minute, taking advantage of 30 char/sec transmission. It will plot 18 in. line — longest possible on the recorder — in under one second.

Ascii compatibility is standard on the \$3,700 unit.

A companion unit is switchable from 30- to 10 char/sec mode, and costs \$200 more.

## Replace Data Recorder

# S/3 Gets Independent Card Peripherals

By Michael Merritt  
CW Staff Writer

WARMINSTER, Pa. — A line of card-handling peripherals for the System/3 announced by Decision Data offer price/performance advantages over the IBM peripherals. The units are compatible with the 5496 Data Recorder and the 5486 Sorter.

Decision's 9601 Data Recorder offers additional features such as automatic blank card feeding during verification, plus and minus right justification, individual column backspacing, and fast card feed and punch times. A more advanced model, the 9610, also interprets the card during punching.

Both can perform free-standing auxiliary operations and offer optional interspersed gang punching and Mod 10 or Mod 11 self-checking number.

The 9601 rents for \$120/mo on a one-year lease, about 20% less than the 5496, which goes for \$155/mo. The interpreting 9610 rents for \$150/mo.

Decision's 9660 Sorting Data Recorder also permits users to perform various card-handling functions such as reproduction, interfiling, gang punching, and posting off-line.



Independent peripherals surround System/3 in the background.

Because of the necessity of using the multifunction card unit (MFCU) to do these things on the S/3, users are forced to tie up the CPU for card manipulation tasks. The 9660 combines some of the MFCU functions with the capability of the 5496 and 5486 data recorder and card sorter in one package that costs a little more than the 5496 alone.

The \$175/mo unit eliminates the need for a separate sorter. It has two input hoppers with a total capacity of 1,000 cards, and six output stackers. Cards are

sorted at 300 card/min, slower than IBM's 5486, and punching and printing can be done at 60- to 120 card/min, considerably faster than the IBM Data Recorder.

### Sorter 50% Faster

The fourth unit from Decision Data is the 9620 Sorter, which is up to 50% faster than the IBM unit, and costs \$120/mo. The IBM unit costs \$115/mo. The 9620 has 11 output pockets, enabling it to sort numerically in one pass, while the IBM model, which has six output pockets, needs 1-1/2 passes.

Similarly, on alphabetic sorting, the 9620 takes 1-2/3 passes, giving it an effective speed of 900 card/min, while the IBM 5486 has an effective speed of 750 card/min, according to Decision Data.

Options include a sort/suppress digit select feature, two total counters, and 11 pocket counters.

In addition to one-year terms, two-year leases and purchase plans are available. The 9601 and 9610 are already in production, and the 9660 and 9620 will be delivered this month.

Decision Data is at 300 Jacksonville Road, 18974.

## Large Core Store Replacements Feature 2.5 usec Cycle Times

Two firms have begun offering large core storage units for IBM's 360/50 that have cycle times only 25% slower than the 50's main memory, and can save some users money.

Both Ampex's ECM-50 and Data Products' System/6000 large core stores have cycle times of 2.5  $\mu$ sec, down from 4  $\mu$ sec in earlier models. Native memory in the 50 has a cycle time of 2  $\mu$ sec.

Both the units began life as plug-compatible replacements for IBM's 2361 Large Core Storage peripheral, which has a cycle time of 8  $\mu$ sec. The independents' units have a capacity of 1 Mbyte, and the Data Products offering is also available in 512K.

By increasing memory size to over 1 Mbyte, both firms say, users can achieve greater throughput and system efficiency by allowing more programs to remain resident in core, reducing time lost in disk searches. Both firms say this advantage more than offsets the 25% increase.

According to Data Products, throughput can increase as much as 2-1/2 times, depending on job mix. Actual benchmarks on CPU-bound jobs showed a degradation of less than 15% compared

with main memory utilization, Data Products said.

A user with 512K of IBM core pays \$19,935/mo for his memory, according to Ampex. By reducing IBM core to 128K and adding the 1M, \$9,225/mo Ampex memory, he would have an effective core size of 1.128 M for \$19,165, and save over \$700/mo.

The 1M Data Products storage facility rents for \$5,425/mo, and maintenance costs \$375/mo. The unit can be purchased for \$244,150. The 512K model leases for \$4,800/mo, and sells for about \$200,000, according to the company.

Data Products plans to install a 1.8  $\mu$ sec large core store for the 360/65 soon.

Various lease and purchase plans are available for the Ampex unit. Ampex is also continuing to rent its older, 4  $\mu$ sec core for \$7,395/mo.

Up to eight of the large units may be attached to a 50, which has a minimum native core of 128K and a maximum of 512K.

Ampex is at 9937 Jefferson Blvd., Culver City, Calif., 90230. Data Products is at 6219 DeSoto Ave., Woodland Hills, Calif., 91364.

## Consolidated Boosts Key-Edit Capability

WALTHAM, Mass. — Consolidated Computer's Key-Edit key-to-tape system now features on-line record insertion and deletion, and its command repertoire has been increased to allow the supervisor to access all tape loading routines, position the tape, and stop the system.

The editing features allow operators to add or delete batch data sorted on the system's intermediate storage device.

There is no additional charge for the editing features or the new commands, the firm said. Consolidated is at 235 Wyman St., 02154.

# Pocket-Sized Data Testers

This is Data Products' new portable communications test equipment: the 404 Pattern Generator and the 404 Data Analyzer. Pocket-sized and priced under \$500 each. High capability. True start-stop distortion measurement with choice of four selectable rates and 5- and 8-level "Fox" test messages.

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## Disks for Novas

SOUTHBORO, Mass. — Data General Corp. is offering two moving head disk cartridge drives, manufactured by Diablo Systems, for its Nova line of minicomputers.

The 4047A has a single cartridge and two 2,200 bit/in. moving heads, while the 4047B has an additional fixed disk and two more moving heads. Average latency time is 20 msec, and both units transfer one word in 11.5 msec.

Capacity of each disk is 1.247 M, 16-bit words. Software available includes a disk operating system, a relocatable assembler, an editor, a linking loader, and extended Algol 60 and Fortran IV compilers.

The 4047A sells for \$5,000, while the larger unit costs \$8,000. The controller costs \$4,000.



## IBM 2245 Prints Kanji

Capable of printing about 10,000 characters, IBM Japan's 2245 printer is a main element in the Kanji Data Processing System. Kanji characters are ideographs widely used in all forms of writing in Japan and in the Chinese-speaking areas of Asia. Other elements of the system include a Kanji keyboard attachment for card punches, and a matrix character generation program package. The system can also print the Japanese Hiragana and Katakana alphabets, as well as Western alphanumeric. At 16 char/line, the \$3,700/mo printer operates at 330 line/min.

## Bits & Pieces

### Teledisc Transmits Display Images

VAN NUYS, Calif. — A system for storing and transmitting CRT displays has been developed by Infotechnics, Inc. Up to 500 frames of 300-line resolution can be stored on a disk memory by Teledisc, and transmission over voice-grade lines takes 84 seconds.

Transmission is accomplished by slowing down the disk to a speed appropriate for telephone lines. The disk is encased in an interchangeable cassette.

A basic system including disk drive and disk, camera, monitor, and acoustic coupler costs \$3,000, and delivery is in two weeks. Infotechnics is at 15730 Stagg St., 91406.

### Tally Paper Tape Unit Adapts to Nova

LINCOLNWOOD, Ill. — An interface to adapt Tally R50 paper tape readers to Data General Nova minicomputers is available from Pivan Data Systems, 6955 N. Hamlin Ave., 60645. Operating at 50 char/sec, the reader and interface can load programs five times as fast as the Model 33 Teletype, Pivan said.

The reader interface can be mounted on a Nova 4007 I/O interface board, or on a board supplied by Pivan that uses one subassembly slot in the Nova.

Reader and interface cost \$1,545 if mounted on the Nova board, and \$1,675 if mounted on the Pivan board.

### 400-, 600 Line/Min Printers Offered for Key Logic Units

WOODLAND HILLS, Calif. — Redcor Corp. is offering two line printers with print speeds of 400- and 600 line/min as options on its KeyLogic key-to-disk system. The printers are IBM compatible, 132 column, fully buffered units. The printers permit users to generate formatted magnetic tapes on their CPUs and then print them in an off-line mode.

The printers are available for immediate delivery, and cost \$600/mo for the 400 line/min unit, and \$800/mo for the faster machine. Redcor is at 21200 Victory Blvd., 91364.

### Unit Corrects Punched Tape

NEW YORK — Visual Graphics Corp.'s Model 401 Merger merges and edits punched tape for phototypesetting operations and computers. The system consists of two tape readers interfaced to a tape punch and a hard copy printer.

After a printout with numbered lines is proofread, a keyboard operator produces a correction tape using the line numbers. The two tapes are then fed into the tape merge system, which produces a clean tape.

The merging procedure operates at 40 char/sec. The system costs about \$9,500, and is available in 120 days from 305 E. 46 St., 10017.

### Kopy Karts Move Disks

CHICAGO — The Martin Yale Kopy Kart, a tea cart-like wagon for moving DP printout, tapes, and disks, will handle over 500 lb of media. Adjustable shelves keep lots separate, and the shelves flip up for access to material on the bottom. The carts are made of tubular steel, have ball-bearing casters and cost \$139.

Martin Yale also sells the Modular/3, a system of storage cabinets for System/3 artifacts. The cabinets have three storage areas: shelves for flat storage of 5440 disk packs; vertical storage of printouts; and instruction and service manuals. The units cost \$270. Martin Yale Business Machines is at 500 N. Spaulding Ave., 60624.

# Now leasing from Leasepac



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If you've ordered or plan to order IBM 3336 or compatible type disk packs, contact your nearest Leasepac representative. He will detail leasing arrangements for the new 3336 — also for 1316, 2316, NCR-type disk packs, and all brands of magnetic tape.

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August 4, 1971

Page 13

## Random Notes

### RPG-II Debugging Aid Available from Nasu

CANOGA PARK, Calif. — Nasu, the National Association of IBM System/3 Users, has developed a programming and debugging aid for use with RPG-II program listings. Two plastic cards show column-by-column field layouts for the seven specification cards used in RPG-II.

Comparable in purpose to the one-card 360 RPG aid IBM developed, the new cards are being distributed without cost, to all interested RPG-II users, Nasu said, "because IBM never got around to it."

Nasu headquarters are at 7251 Owensmouth Ave., 91303.

### Com-Share Network Handles 600 Bit/Sec Transmissions

ANN ARBOR, Mich. — Time-sharing users can communicate with the Com-Share network at rates of 100, 300 or 600 bit/sec, by using the Memorex 1240 terminal. The terminal includes printable graphics, a 120-character print line and a tabulating capability.

Connect time charges will vary from \$10/hr for 110 bit/sec service to \$20/hr for 600 bit/sec. Com-Share is at 2395 Huron Pkwy, 48105.

### Direct Access Source Libraries Supported by 'Pulmacs' Version

PHILADELPHIA — A Direct Access version of the Pulmacs source statement librarian is available to DOS/360 users from Management and Computer Services Inc.

Programs in the library can be dated, deleted or processed by Pulmacs, but the system includes a security key to prevent unauthorized tampering. The direct access Pulmacs costs \$1,495, from 104 Park Towne Place East, 19130.

### Varian 260/f Gets Transsembler

LOS ANGELES — Programs written in the Varian DAS language for use on the Varian 620/f minicomputer, can be assembled on a wide range of host CPUs, through the Transsembler package from Code Inc.

Written in Fortran IV, 620/f Transsembler can be used on IBM 360s, under DOS or OS; XDS Sigma 5 or 7; the CDC 6000 series, IBM's 7090 or on GE 600 and Univac 1108 processors. The package costs \$1,250 from Code at 8939 Sepulveda Blvd., 90045.

### Ards Software Now Free

BOSTON — Software for the Ards 100B Graphics Terminal, including Ardware and Graphsys/Plot program packages, will be made available by Adage Inc. without cost to current and future users of the Ards equipment. Previously the packages sold for \$2,000.

Adage is at 1079 Commonwealth Ave., 02215.

### Itel Provides A/R Service

NEW YORK — Users whose in-house equipment is crowded with more important applications can have their accounts/receivables accounting handled by the Mini-Account service of Itel's Data Processing Division.

Handling each user in a batch-processing mode, Mini-Account service is designed for companies having 100 to 150 invoices a month, Itel said from 1120 Avenue of the Americas, 10036.

## Two Non-IBM Sources

# Vendors Customize S/3 Applications

By Don Leavitt  
CW Staff Writer

IBM S/3 users can avoid the problems of writing their own accounting and inventory control systems, but still have processing tailored to their specific needs, with packages from two independent sources.

Systems from Certified Software Products of Minneapolis, Minn., include inventory control, accounts payable, accounts receivable, payroll and general ledger-financial statement preparation. They can be implemented on an 8K card-oriented S/3 or be tailored to use more core and/or the S/3 disk system.

Another inventory control system is available from Rollnick Shoe Co., Denver. Developed by Rollnick for its own use, it has features quite different from the Certified inventory package.

Variations of each of the Certified systems have been generated for wholesale, retail and accounting firms and service centers. Modules designed for manufacturing and construction firms, chain stores, franchises and institutions are also "on the shelf," Certified said.

The inventory control system includes transaction proof registers, action reports and stock status summaries.

Accounts payable processing provides transaction journals, a payables ledger and analysis of current cash requirements. Check writing and remittance information, check register analysis and a general ledger distribution summary are also included.

Transactions entering the accounts receivables system are journalized and posted to customer files. The system provides sales analysis and aging of ac-

counts and statement preparation.

Users can, in most cases, implement their existing chart of accounts on the general ledger financial reporting system. Complete journals are maintained for each of the accounting sources.

The packages range in price from \$1,000 to \$5,000 each, depending upon the amount of customization required. Certified Software Products is at 2419 Nicollet Ave., Minneapolis.

### Rollnick Package Spots Trends

The Rollnick inventory system compares current sales of an item to stock on hand, to determine the number of times that item inventory would be turned over in a year. If management notes changes in the sales/inventory ratio, it can recognize trends and take appropriate action.

A size analysis, though particularly applicable to the shoe industry, could be adapted to situations in which a wide range of comparable items are available, but only part of the range is heavily used.

An analysis of vendor sales enables the user to anticipate which supplier provides the most suitable items.

The basic inventory system is priced at \$1,000 to \$1,500 depending on customization requirements. The vendor and class analysis features are extra-price options.

Rollnick Shoe Co. is at 544 Acoma St., Denver Colo., 80204.

## Programmers' Clerical Work Eased Through Use of 'Ttxtm' DOS Utility

ENCINO, Calif. — IBM 360 programmers can reduce the clerical effort needed to maintain source programs in any language, or data files, with the Text Maintenance (Ttxtm) program from Joseph Sider and Associates.

The control cards used to structure Ttxtm operations allow the user to maintain tape or disk files for any type of text that could have originally been stored on cards.

The package allows the user to make "global" corrections. One control card is required, for example, to correct a misspelling that occurs in multiple locations.

Ttxtm also allows the user to restructure a program, resequencing blocks of instructions without having to manipulate the source deck itself.

New records and corrections may be entered from both tape and cards on the same run and the new file may be on either tape or disk.

The DOS version is available for \$100/mo. An OS/360 version is being developed.

Joseph Sider and Associates is at 15713 Varden St., 91316.

## Codasyl Cobol Journal Issued

OTTAWA, Ontario — Copies of the *Codasyl Cobol Journal of Development-1970*, showing the official Codasyl Cobol language specifications as of Dec. 31, 1970, will be available this month from the Canadian Government Specifications Board, Department of Supply and Services.

The specifications included in the journal were developed by the Codasyl Programming Language Committee (PLC). Codasyl Cobol contains all features PLC feels should be part of the language.

Codasyl Cobol forms the basis from

which American National Standards Institute (Ansi) develops the list of specifications included in its definition of a Cobol standard.

The current ANSI Cobol, published as a standard in 1968, was based on the 1965 edition of the *Codasyl Cobol Journal of Development*.

Copies of the journal cost \$2.50 each, which includes postage and handling. Payments should be made to the Receiver General of Canada, through the Department of Supply and Services, 88 Metcalfe St.

## Users Should Be Up in 'Arms' About Receivable Processing

CHICAGO — IBM 360 users operating under either DOS or OS can exercise a number of options in handling multiple company or multidivisional accounts by using the Accounts Receivable Management System (Arms) package from Statistical Tabulating Corp.

The package accepts input on cards, magnetic tape, or on OCR-encoded documents. Remote processing is possible through a variety of communications devices, according to the company.

The system requires 65K of memory, two disk packs and four tape drives. A five-year right to use the package costs \$15,000 but a lease arrangement for 24 months is also available. Forty man-hours of education and instruction are included.

The Stat Tab Division is at Two N. Riverside Plaza, 60606.

## 'Mini-Grasp' Aids Small 360s

EL SEGUNDO, Calif. — Users of IBM 360/25s and 30s may be able to avoid hardware upgrading by using a small version of the Grasp spooling package available from Software Design Inc. By spooling output for a 360-compatible printer, Mini-Grasp increases throughput while using only 4K of memory.

Mini-Grasp is said to include many of the features of the full-scale Grasp, including back spacing capabilities and wrap-around disk usage. The small package rents for \$216/mo, sells for 25 times that amount from 999 N. Sepulveda Blvd., 90245.

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Financial Security

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## Cobol-D Gains ANS Features

WOODSIDE, N.Y. — Despite IBM's withdrawal of support, users can upgrade their Cobol-D compiler through extensions available from Berkey Marketing Companies Inc.

With the extensions, Cobol-D is able to accept input from a system or private source statement library. The extensions use the same "Basis" control card to identify the catalogues Cobol-D source program, as does the IBM ANS Cobol.

The extended Cobol-D also accepts ANS Cobol-compatible comment cards anywhere within the Cobol-D source program. This would allow the user to document the Data Division of his Cobol-D program, a capability that is not available without the extensions.

The Berkey extensions also permit the Cobol-D programs cataloged in a source statement library to be maintained through the UPDATE function of IBM's System "Maint" program. Temporary update facilities at compile time will be added to the extensions shortly, the company said.

The \$1,900 purchase price of the current extensions will provide users with additional extensions as they become available.

The Data Processing Division of Berkey Marketing is at 25-20 Brooklyn-Queens Expressway West, 11377.

## DOS-OS Assembler Conversions Eased

SPRINGFIELD, Ill. — IBM 360 users shifting from DOS to OS should be able to reduce sharply the time and money needed to convert Assembler Language programs manually, by using the Language Conversion System (LCS) developed by Horace Mann Educators.

The LCS is made up of one Cobol program and a set of macros that can be used with either the DOS or the OS Assembler. With that built-in flexibility, program conversions can be run at any time without regard for the operating system then in use, a spokesman noted.

The system is said to be extremely fast, and quite complete. An average program of 1,000 statements can be converted in 10 minutes according

to the company. IBM has said that converting 1,000 statements manually would take 21 hours.

### 90% Converted

The conversions done by LCS are about 90% complete. The system is able to handle all sequential file organizations, including index-sequential. All operator communication and console typewriter functions are handled, Horace Mann said.

Printer and punch control, and spacing and skipping features are converted for Sysout. Register saving and restoring, and step initialization and termination routines are completely handled, the spokesman added.

The system may be purchased for \$5,800, but leasing arrangements are available from Horace Mann at 216 E. Monroe St., 62701.

## Brokerage Back Offices Use Informatics 'NOS'

CANOGA PARK, Calif. — Brokerage offices using IBM 360s can handle all their back-office accounting procedures with the New Operations System (NOS) from Informatics Inc. This system is said to overcome the problems encountered by previous back-office systems.

NOS can be used to compute commissions, taxes and fees, and to prepare confirmations of trades. The system updates the customer's account and stores the transactions for subsequent processing.

The system's modularity allows the installation of independent subsystems for purchase and sales, "fails", stock record and customer accounting, as well as dividend processing, the company said.

Originally developed for the Dean Witter brokerage house, NOS is flexible enough to react to new business regulations and to market growth, Informatics said. Through the use of comprehensive data bases, it is able to control changes in both financial and inventory positions.

Using an extensively modified version of IBM's Brokerage Communication package, BCCAP, NOS is able to process approximately 36,000 messages per hour from Dean Witter branch and division offices.

The BCCAP system has been modified to validate and capture on disk six types of data as they go through the system.

NOS is customized for each user. Written in Cobol, it could be adapted to CPUs other than the 360.

The NOS project is being directed by Informatics New York regional office at 65 Route 4, in River Edge, N.J., 07661.

## Job Shops Scheduled Under WTSC System

PITTSBURGH, Pa. — Job shops in virtually any industry can gain stricter control over their operations, including the ability to establish work priorities based on up-to-date information, with a production scheduling and reporting system from Westinghouse Tele-Computer Systems Corp (WTSC).

The system is available as a package for a user's in-house 360, or as a remote batch service through four WTSC offices on the East Coast and in Chicago.

The system uses three input forms: job order routing slips, time tickets, and material data sheets. From these, it generates a weekly machine load report and a production scheduling work sheet for planning purposes.

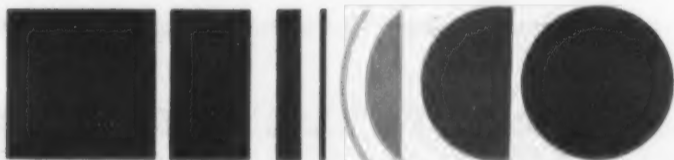
Job status, time, and closeout reports are also produced so that actual experience can be compared to estimates.

By producing these reports on a timely basis, the system is said to highlight those orders that are getting behind schedule.

The system is written in Cobol and has been running in a 32K partition under OS/360. Adapted to a user's specific requirements, the package would cost from \$10,000 to \$20,000 for in-house use.

The WTSC offices offering remote batch service are in Arlington, Va.; Chicago; Millburn, N.J.; and Pittsburgh. WTSC is at 2040 Ardmore Blvd., 15222.

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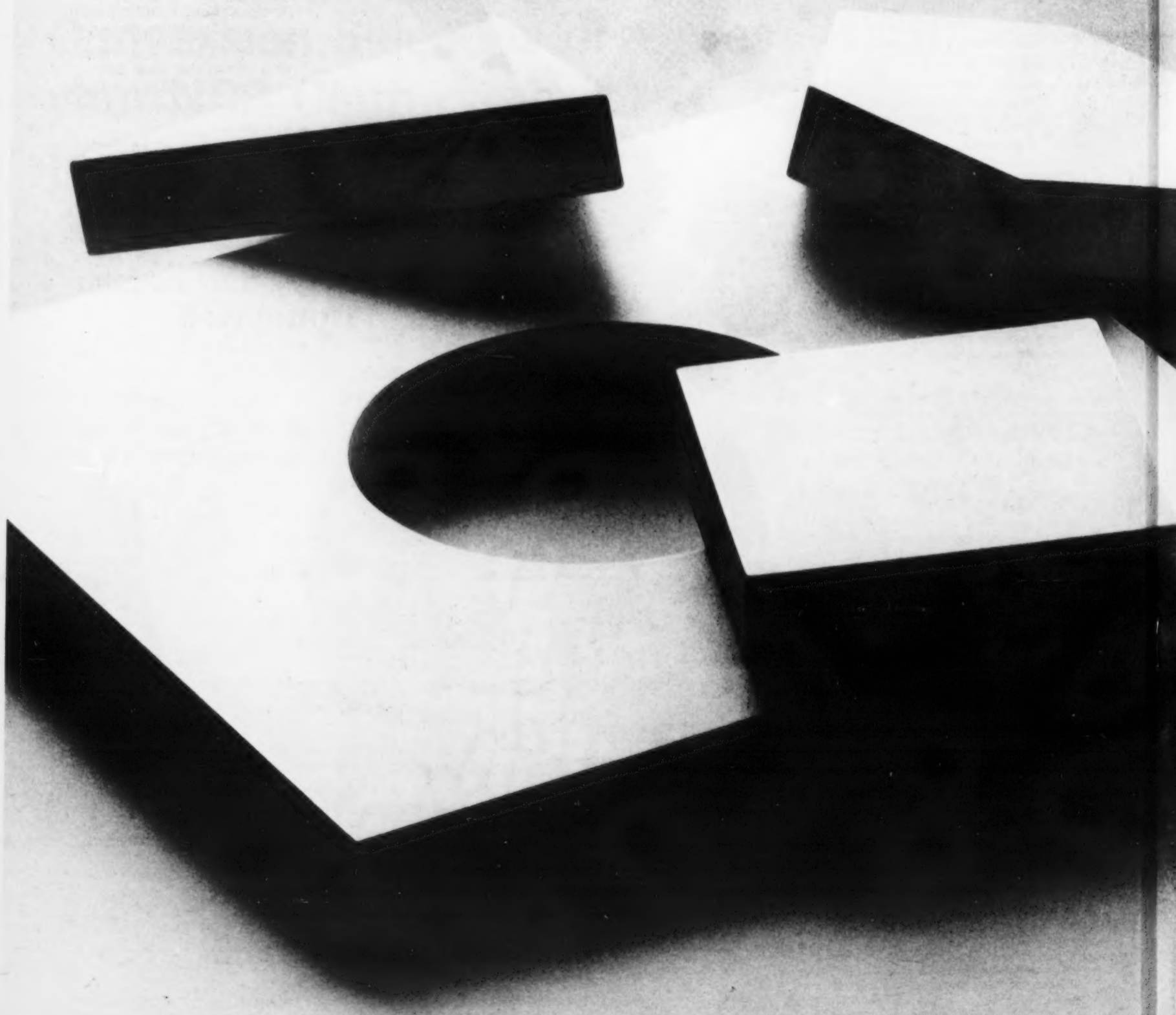
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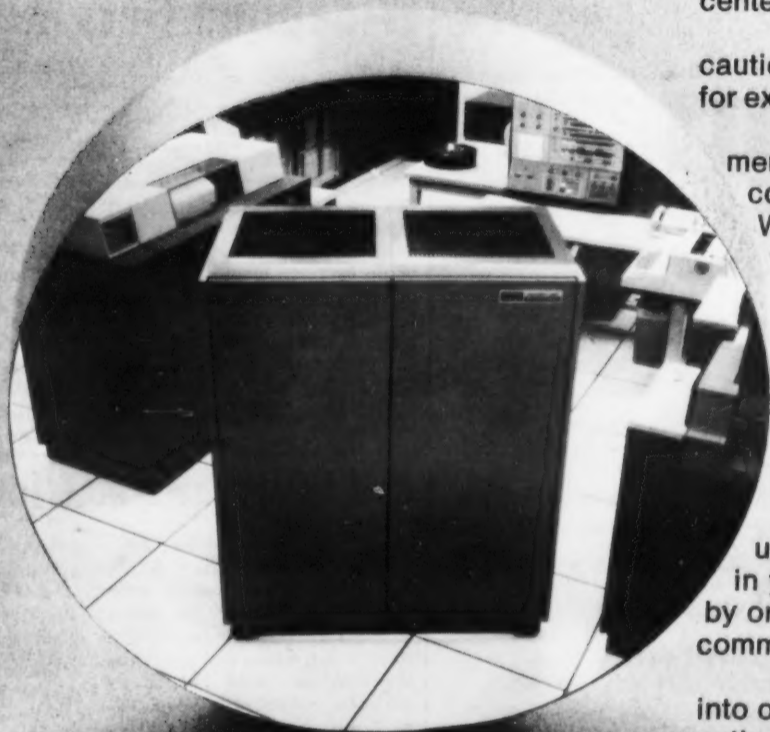
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For years you've heard and read about plug-to-plug IBM-compatible core storage memories. You've been told to buy or lease more core storage instead of going to a new system. You've been told that all it takes is a big box full of core with a connector that you plug into your central processing unit. You double or triple your memory capacity. Your system keeps humming along without interruption. And there are no painful conversion problems or costs.

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We've designed a unique "buffer box" that protects your central processing unit by isolating its circuitry from our memory in every way — except for data transfer. In no way do we violate existing hardware.

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## FCC Office Would Help Users

By Ronald A. Frank

CW Technical News Editor

WASHINGTON, D.C. — Data users who want to get involved in regulatory issues before the Federal Communications Commission may soon get free expert advice from a special office of the commission.

The plan to establish an FCC Office of Public Counsel was proposed by a task force of commission staff members formed to recommend improvements in the agency's operations.

The task force concluded users and other citizens are often inadequately represented in matters pending before the commission.

In order to explain the regulatory and legal steps required for formal participation in FCC matters, the task force proposed that the public counsel office would include a staff of lawyers

that could intervene on behalf of citizens, users, and others in any commission proceeding.

The establishment of an office to look after the public's interest is believed to be the first of its type for a regulatory agency. As envisioned by the task force, the office would provide legal representation with government funds

public counsel office, some FCC members are said to favor setting up only an advisory body.

One problem with the proposal is that it could create a conflict of interest if the Office of Public Counsel were to oppose positions taken by the commission or its staff, an agency source told CW.

One alternative to the task force plan now under consideration would set up the proposed office as strictly an advisory body that would give users specific information up to but not including actual legal representation, the source said.

Whether or not the FCC agrees to a modified plan for the proposed office, it may vote to publish a manual on commission procedures which could include advice to users on the proper methods to approach the commission on regulatory issues.

### Communications

to represent the public before the commission. Such an office would be the equivalent of a private law firm operating separate from the commission or its staff.

Although the plan is currently under consideration by the commission, its full approval is considered doubtful. Rather than appoint lawyers through the

## Wideband Gets Multiplexing

NEW YORK — AT&T has modified its wideband private line tariffs to allow users to install multiplexers.

In a notice of proposed changes, AT&T told the commission it plans "to permit customers, authorized users, or joint users, by use of their own equipment, to create additional channels by subdividing wideband channels."

The practice of subdividing existing channels to create new channels is interpreted as allowing data users to multiplex their lines.

The modifications affect users of the following interstate AT&T services: Series 5,000 (Telpak), Series 8,000 (Wideband Data), and Series 11,000 (Point-to-Point Wideband).

The new regulations scheduled to become effective late last month include sequential synchronous data transmissions at 19.2-, 40.8- 50-, and 230.4 kbit/sec.

The changes restrict users to time division multiplexing and stipulate that existing AT&T interconnection requirements must be observed.

## Bell Withdraws MCI Legal Appeal

By a CW Staff Writer

WASHINGTON, D.C. — AT&T and Western Union have given up their attempts to block Microwave Communications Inc. from constructing and operating the first interstate link in its network between Chicago and St. Louis.

The cases, which had been pending before the Court of Appeals here, were largely overshadowed when the FCC issued its findings in the 18920 specialized common carrier proceedings recently.

By ruling that it was in the public interest for the new car-

riers to provide service in competition with AT&T and the other existing carriers, the FCC effectively nullified the appeals pending in the court.

The initial MCI link was not a part of the 18920 ruling but the carriers apparently dropped their appeals in the face of unanimous FCC approval for the new carriers.

The action apparently ends a fight begun in 1963 by MCI to offer interstate services to users. Construction on the link has been completed and is expected to begin operating in the fall.

## Technical Rules Stayed for AT&T

WASHINGTON, D.C. — At AT&T's request, the FCC has stayed a portion of its recent ruling on the specialized common carriers. The stay applies only to the modification of existing microwave facilities.

AT&T had said the new regulations, which involved a change in the number of protection channels required on microwave routes, would cause serious ad-

verse results on its communications routes.

In ordering the stay, the commission said it recognized existing carriers would need some time to formulate plans on converting their systems to the new regulations.

The stay will have no effect on the new specialized common carriers planned by MCI, Datran, and others, an FCC spokesman said.

## Timeplex Linebacker Reconnects Data Lines

NORWOOD, N.J. — An automatic data device from Timeplex Inc., called a Linebacker, establishes a full duplex dial-up circuit whenever existing private wire or dialed connections fail.

If a dedicated leased line opens, Linebackers at each end of the link automatically dial an alternate full duplex connection. The Linebacker continues to test

the dedicated line and switches back when continuous service has been restored.

Should a dial-up line fail, the Linebacker will automatically dial and redial. The Linebacker is compatible with any modem that can operate over the dial network and costs \$1100.

The unit is available from the firm at 65 Oak St.

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## 2. DOS. Can It Really be Emulated on the 370?????

On the surface it looks like a great way to upgrade your system, but—who has tried it, and what do they say? What does the documentation look like? What has to be done before it is fully workable?

## 3. Problems in Systems Control Programs

Why should we pay for computer time that is used to identify—and correct—IBM's software problems?

## 4. What About the New SCP's for the System 3, 370, and Others?

## 5. Microcode, When, Where, and How?

Will microcode be used for some SCP functions? Will it be used in our small machines?

## 6. System 7.

Can it be used only as a sensor based device or is it possible to use as a stand alone processor for special jobs?

## 7. FORTRAN and COBOL on Small Machines

What has to be done to make FORTRAN and COBOL compatible across all small systems? What will this imply for user management?

## 8. Data Base Management, What's New for the Small User?

How will the new data base management systems affect you? When, where, and how should you use them?

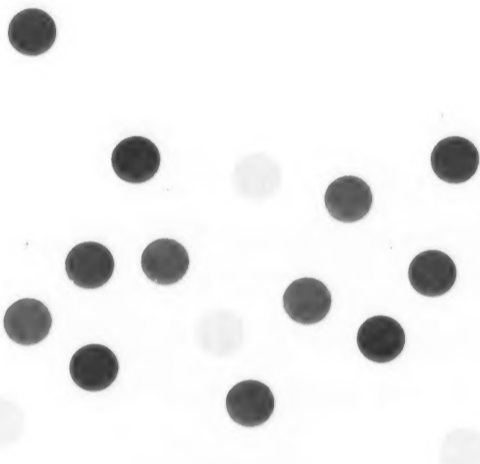
## 9. Patents, What Are Your Liabilities?

Software has been patented, and every user should know of the potential liabilities he may incur if some patents are upheld.

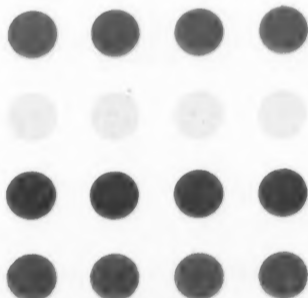
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If you're still not convinced that COMMON is for you, then phone Ken Conrade—Gibbs and Hill, Inc.—(212) 565-4300 for more details. Better still, though, register on August 8th or 9th and come—in person—to sound off!

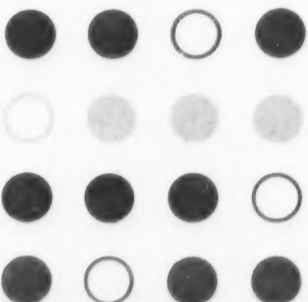
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## Huge Plotter Draws Such Straight Lines, Laser Must Detect Variances

PHILADELPHIA, Pa. — Who can draw the straightest line in the world? If the line is more than just a matter of inches in length, it could be Max Levy & Co., Inc., using its large-scale, computer-controlled plotter. Lines five feet long, accurate to 50 millionths of an inch can be drawn with the device.

To discern the accuracy of a line, the laser interferometer that calibrates this plotter, the Levy Autograph ruling engine, would have to be used.

Master drawings produced by the plotter are used by many large companies and government agencies to check the accuracy of other plotters, grids, maps, and scales; by the manufacturers of optical measuring instruments to check lens accuracy; and by electronic equipment manufacturers in the design of circuitry, according to Robert Atkinson of Max Levy.

The firm makes master drawings for a number of electronics companies which use them in

the manufacture of printed circuit boards.

Multi-layer boards, which can be stacked 40 and 50 layers high, require extremely close tolerances in the master artwork to ensure proper alignment and circuit interconnection.

The plotting device is a giant unit that took five years to design and build. Its base is a 15,000-lb block of granite mounted on 12 vibration-isolated concrete pillars. An iron gantry weighing more than 2,000 lbs is driven in the Y coordinate direction at each of its ends by two very precise lead screws. A carriage is driven in the X direction by a similar lead screw.

Almost all the masters generated on the plotter are written with a beam of light onto photoresist on metal-coated glass, ground, polished and etched by the firm.

A system designed by Concord Controls of Boston, Mass., and built around a DEC PDP-9, controls the plotter.

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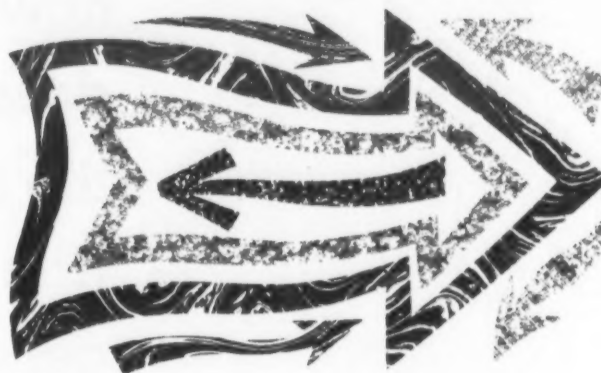
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## Criminals' Quirks Filed With 'Modus Operandi'

KANSAS CITY, Mo. — Deep in the memory of a computer in Kansas City is Mac the Knife, a rapist. Nobody knows who he is — only that he invariably uses a peculiar knife in his assaults.

But if Mac is ever caught, the computer may help pin a whole series of crimes on him.

The computer is running a program called Modus Operandi. Under it, police officers here reporting a burglary, robbery or sex crime also fill in coding sheets with information about how the crime was committed — such details as whether a burglar broke through a screen door or whether a rapist attacked near his victim's house.

These facts are filed and cross-indexed by the police department's computer. As the files build up, detectives can query the machine to discover patterns of operation — the modus operandi of individual criminals.

The associative cross-filing gives police officers the chance to personalize otherwise faceless criminals.

Once a person is convicted of a crime in the files, his name is included in the dossier, according to Melvin Bockelman, head of data systems for the police department.

The computer is being helpful, one detective said. "Several rapes have been cleared and several arrests have been made," said Capt. James F. Campbell. Of the 20 rapes reported in June, eight have been cleared and warrants have been issued for two suspects.

Modus Operandi was written by Kansas City Police programmers, Bockelman said, using ideas gleaned from other police

departments and some native ingenuity.

The files maintained under the program include a physical description of any suspects, details of the circumstances of the crime, and actual modus operandi.

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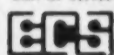
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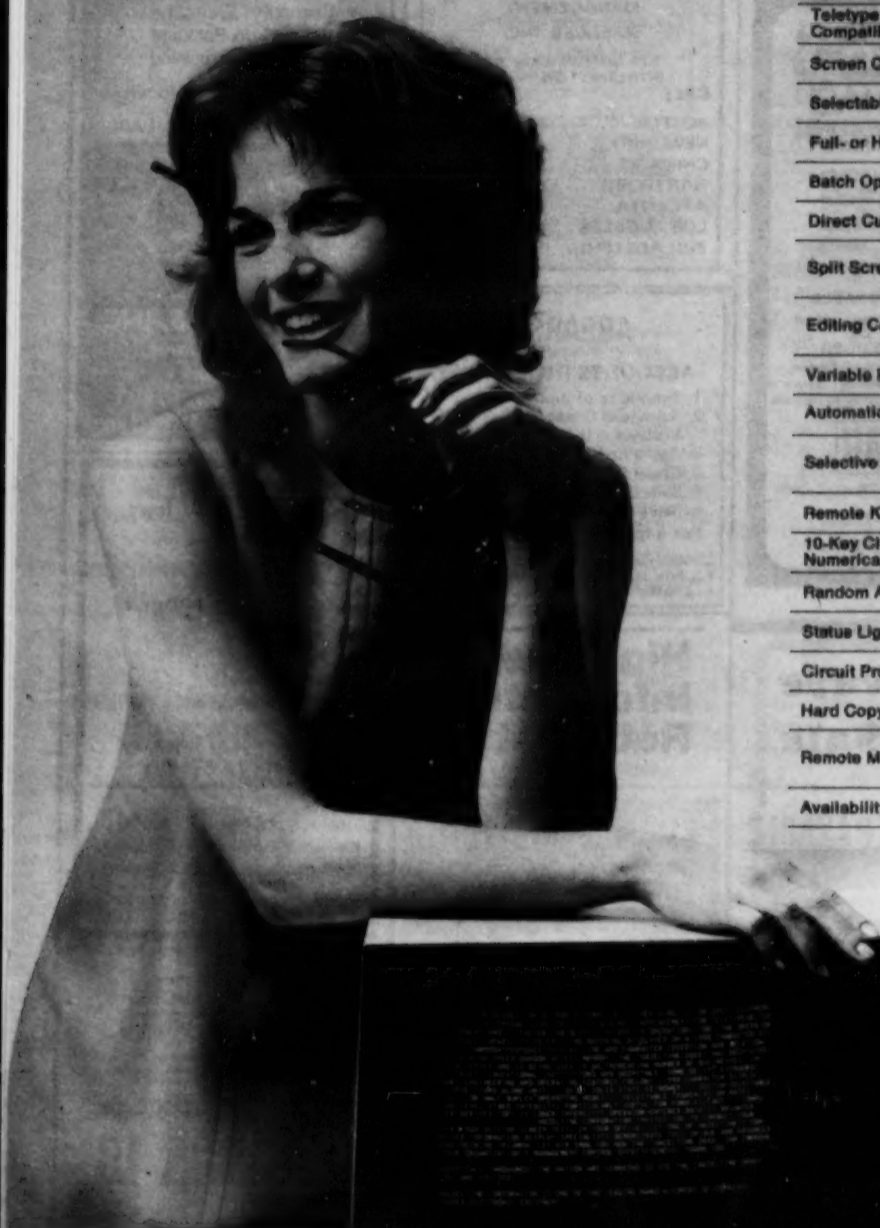
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Batch Operation	Yes. Switch-selectable.	
Direct Cursor Addressability	Yes. May be program-directed to any screen position by transmitting X-Y coordinates.	
Split Screen	Yes. Computer-derived data is lower-intensity (background); operator-entered data is brighter (foreground).	
Editing Capability	Yes. Line and character insert/delete. CPU can clear entire screen or foreground data only.	
Variable Field Transmission	Yes. Foreground data only is transmitted to CPU.	
Automatic Tabulation	Yes. TAB key directs cursor to next entry point.	
Selective Scrolling	Yes. At any line when under program control; automatically at line 1, unless otherwise directed.	
Remote Keyboard Operation	Yes. Quiet, solid-state keyboard may be operated remotely.	
10-Key Cluster for Numerical Input	Yes.	
Random Access Memory	Yes. 2048 X 8 Core.	
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# COMPUTER INDUSTRY

a Computerworld news section about the nation's fastest growing industry

August 4, 1971

Page 25

## CI Notes

### ICL Cuts Employees

LONDON — At the same time RCA announced its intention to penetrate the British computer market, its licensee there, International Computer Ltd. (ICL), announced a major reduction in staff, but the two moves appear unrelated.

ICL said the layoff, which involved 1,800 employees at six plants, was part of a continuing program to streamline operations. In May the firm closed its plant in Croydon, idling 800 other employees.

### XDS Extends Com-Share Note

ANN ARBOR, Mich. — Com-Share Inc. and Xerox Data Systems have agreed to an extended payment schedule for computer equipment rentals owed by Com-Share.

Under terms of the agreement, XDS received a security interest in selected Com-Share assets as well as other rights. Richard L. Crandall, Com-Share president, stated that the agreement improved his company's current working capital position and placed the company on a current payment basis with XDS.

### NYSE Adds Amex Stocks to BAS

NEW YORK — The New York Stock Exchange has expanded its Block Automation System to include American Stock Exchange issues, and developed a new means to transmit confirmations from brokers to institutional customers.

The big board's nationwide network for block trades now facilitates the matching of buy and sell interests in 3,200 NYSE and Amex stocks and 1,500 NYSE and Amex bonds.

In addition, BAS now is able to teletype to institutional subscribers an overnight statement confirming details of their block trades executed during the day.

### Supershorts

Compata, Inc., has delivered a Report Program Generator (RPG) for the Westinghouse 2500 computer. This RPG package enables the 2500 to process business application programs written as compatible subsets of IBM System/3 RPG II.

Itek Corp. has reorganized its Wayne-George Division under the name Itek Measurement Systems Division.

Itel Corp. has entered into an agreement to acquire World Wide Time Sharing, Inc. The agreement provides for the acquisition of substantially all of the assets of World Wide Time Sharing, Inc. subject to the assumption of substantially all of its liabilities by Itel or a wholly owned subsidiary.

Xintel Corp. has delivered its first production model of the advanced Spectrum 1 high speed MOS bipolar tester to Electronic Arrays, Inc., Mountain View, Calif.

Tally Corp. has agreed in principle to acquire Engineered Data Peripherals Corp.

## Redcor Protests

# Controversy Hits Key-to-Disk Contract

By E. Drake Lundell Jr.

CW Computer Industry Editor

WASHINGTON, D.C. — The government's first major attempt to replace keypunch systems with key-to-disk data entry devices is embroiled in controversy and protest here.

The contract was awarded under RFP SSP-70-27 awarded by the Social Security Administration to Honeywell on July 7, but is now the subject of a protest on the part of Redcor Corp., which claims that it offered the lowest price on the systems involved.

The procurement has been in the works for over a year and is considered a major test of the key-to-disk concept in the government, the largest user of keypunch equipment in existence.

Originally 33 firms had bid on the project, but this was narrowed down to around five by the final round of bidding. The finalists included Computer Machinery Corp. and Inforex, government sources said, in addition to Honeywell and Redcor.

In contest under the procurement are over 20 key-to-disk systems with over 600 keystations spread over eight Social Security sites. The exact number of systems and keystations was variable depending on the configurations bid by the various manufacturers.

Honeywell reportedly offered the gov-

ernment a five year rental with option to purchase plan for its Keyplex system. The cost for the first year of the contract for rent and maintenance would not exceed \$432,800 under the agreement, sources revealed. The total for the five years would be somewhere over \$2.5 million.

Redcor said that its proposed system would cost the government less than the Honeywell bid when all the factors were taken into consideration.

In a letter to the Controller General of the U.S., Elmer Staats, the firm said, "Redcor is technically equal or superior to any other prospective contractor and submitted the lowest price . . . More-

over, the Redcor system also realizes a lower labor operating cost to the Government."

In addition to claiming to offer a lower price system, Redcor feels the government weighed the procurement in favor of the Honeywell system and is requesting that the Social Security reveal its weighing procedure for the various bids.

In addition, sources said that the Social Security Administration had strongly hinted it wanted a system that was commercially in use, but that the Honeywell system, while presently in the field in a few places, is not in commercial use yet.

## Western Mini Makers Still See Shakeout Coming In Industry

By a CW Staff Writer

LOS ANGELES — Several minicomputer manufacturers on the west coast see still more shakeouts in the business, especially for manufacturers that base all of their plans on one product.

Digital Scientific in San Diego had its own problems with financing earlier this year and now predicts that the shakeout in the industry is still in the future, according to Eugene Courtney, general

manager.

He said the volume of business would increase rapidly, but the number of manufacturers still in the business would be going down at the same time, leaving a larger pie to divide up for those left.

The glamour has gone out of the mini business to a large extent, he added, especially by those who felt it was an easy business to enter.

"If you're a one product company, you are in an exceedingly vulnerable position," according to George Vosatka, president of Varian Data Machines in Irvine.

"Any mini manufacturer of substance is looking to the end user market and development of complete systems with proprietary software packages," he added.

### \$1,000 Mini Seen

Vosatka predicted that the cost of minicomputers complete with memory systems would be under \$1,000 within four years. This, he added, makes the volume of sales very important to any manufacturer and will make them produce systems where the mini is only a part of the total package.

Varian presently reflects a strong OEM bias with 60% to 70% of its business in this area, but is trying to reverse those figures, because there is not much profit in the OEM side of the business.

The OEM business is also very volatile, spokesmen for the firm said, since OEM customers can shop around for the best price and switch to another manufacturer at almost any time. It is possible also, the firm indicated, that large OEM customers might begin to make their own minis in the future.

Richard Halligan, vice-president of marketing for Computer Automation, doesn't share this view however. He said OEM customers will not be able to afford to set up automated techniques to keep their costs down like the mini makers are doing unless the OEM is producing over 1,000 units a year.

To be able to produce minis at a price per unit level competitive with the present companies manufacturing systems would require a tremendous investment on the part of the OEM customer, he said.

At the same time, the prices in the mini market will be continually dropping, Halligan said, which will serve to broaden the overall market for minis over the next few years.

## Commerce Secretary Outlines Plans to Boost Computer Trade

By Alan Drattell

CW Washington Bureau

WASHINGTON, D.C. — While computers are aiding our trade balance with foreign nations, they are not enough to forestall a possible negative trade balance for the first time in 78 years.

The Nixon administration, thus, sees the necessity for governmental action to "maintain the pre-eminence of American technology in the world market."

A review of our trade practices and position and various remedial programs for federal action were proposed by Secretary of Commerce Maurice H. Stans in testimony before the House Subcommittee on Science, Research and Development last week.

## RCA Outlines Plan To Market Systems In United Kingdom

MARLBORO, Mass. — RCA, as part of its drive to become number two in the computer business, will move into the UK.

Previously RCA had been content to license its computer technology to overseas firms instead of marketing directly in those areas. As a result the firm ranks number two or three in terms of the domestic U.S. market, but falls down to at least number six among the mainframe makers in the international marketplace.

The new operation will initially market the new RCA 2, 3, 6 and 7 systems introduced in the U.S. last September. It will be headed by C. Ridley Rhind, another ex-IBM'er now in the RCA stable, as general manager.

In the past decade our trade surplus in computers has risen from \$44 million in 1960 to \$1.044 billion in 1970, Stans said. However, during the same period, the U.S. overall balance of trade has deteriorated from surpluses of \$5-\$7 billion in the early 60's to \$1-\$2 billion levels since 1967.

"The major element," Stans said, "which we can influence decisively for the long run is the level of technological development. It may be our only hope of maintaining a future trade position adequate to support our balance of payments in the years to come."

Stans, seeking governmental action, offered four program options which he feels the administration and the Congress must investigate:

- Establishment of a single federal focus for activities directly related to enhancement, assessment and forecasting of industrial technology
- Financial help to stimulate the development and utilization of new technology
- Modernizing antitrust laws that now prevent joint ventures and joint research
- Encouraging "the setting of voluntary standards where appropriate and mandatory ones where absolutely necessary."

More effective standards, according to Stans, can be achieved by avoiding frequent changes in standards, substituting performance standards for material standards and pre-empting state and local standards or promoting uniformity among them.

He added that in international trade "it is extremely important that the U.S. insist upon participating in standards-setting negotiations to avoid prejudice to our products."

## Marketing Man 'Tries Harder'

# Customer Familiarity Seen Key to Success

By Alan Drattell

CW Washington Bureau

PITTSBURGH, Pa. — Because John Gropper, a 33-year old systems engineer for Sanders Associates in Nashua, N.H., tried harder, his company got the largest commercial contract in its history earlier this year.

In a recent interview, Gropper disclosed how Sanders inked a competitive terminal reservations award here that is expected to bring between \$10 and \$15 million into company coffers in the next two years.

Gropper's try harder approach with the customer, Avis Rent-A-Car System, was quite simple: he used a marketing concept that literally put him behind the driver in the driver's seat. Gropper performed on-the-job activities that Avis employees perform — from renting cars

to greasing them.

"The concept," Gropper explained, "is that a qualified customer is someone who has money and is aware of what he does for a living in the most direct manner possible — a real shirtsleeve kind of working behind the counter, the grease monkey style of operation."

"And let him know that you know. Speak to him in his language, in his terms. Don't talk high powered electronics technology to a garment manufacturer. Don't talk communications theory to a guy in a steel mill."

### 4 Year Job

Gropper and Sanders worked on the Avis contract on and off for a period of four years and earlier this year were awarded the terminal reservation portion. The terminal used is a buffered printing

unit, programmable, according to Gropper, in that the prompter which guides the operator through a variety of sequences can be set to pick out any one of the 64 messages in any sequence depending upon the type of operation.

"The terminal," he added, "is really the product of a lot of us sitting down and working out what the business of Avis is and what the problems were. Things like percentage of rental agreements had arithmetic errors in them, what it cost them not to be precisely aware of where their cars are or how to position their cars for a Monday morning at Pittsburgh Airport."

Among the on-the-job stints was two weeks double shift behind the counter at Pittsburgh Airport. "I'm very proud of the red jacket that I still own," said Gropper, referring to the blazer worn by Avis personnel the company gave him.



John Gropper (left) of Sanders trains

At first, Avis was a little skeptical of his marketing approach, Gropper said. "But they recognized they were getting a substantial amount of support in their own analytic activity. As a result our proposal looks like it was written by an Avis man; it was aimed at every single level in the decision chain."

### Concept Applicable

Gropper explained that other companies can successfully adopt this concept. "The task of a systems marketer who is going to be at all innovative and do a competent job for his customer is that of marriage broker — a guy who arranges a meeting between a problem the customer has and the technology which his company has."

Gropper said that in today's market a systems engineer cannot walk into the customer with preconceived notions of what he's going to peddle. "You've got to walk in there with the attitude that my company does not make everything nor is my company competent enough to satisfy every problem that exists."

Gropper said that his marketing approach resulted from his ignorance.

"I'm not an engineer. I'm a mathematician," he explained, "so I really don't know the heart and soul of electronic equipment. I really don't feel competent to talk about it except in the sense of functional discussion. And as a result of that, earlier on in my career when I was involved in military electronics the thing I found I could do best was called operations research."

## McDonnell Unit Sets ECG Analysis Service

ST. LOUIS — Computer analysis of electrocardiograms for health care facilities will be offered by McDonnell Douglas Automation Co. under a program announced recently.

The service is being marketed by the company in association with United Med-equip Corp., of Pasadena, Calif., which specializes in marketing health care equipment and services.

The system uses a mobile ECG data collection terminal which may be moved to a patient's bedside and connected to ordinary telephone lines. After 10 electrodes are attached to the patient, the terminal automatically transmits information on the electrical functions of the heart to the computer center's CDC 1700 which is used in the application.

The 10-lead ECG recording and transmission takes 27 seconds, the firm said. A copy of the results is transmitted to the health care facility for the doctor to compare with the scalar ECG tracing which is also simultaneously recorded by the mobile ECG unit.

## Concorde Uses Computers

By the CW European Bureau

LONDON — A miniature computer installed aboard Concorde, the Anglo-French supersonic airliner, will supervise the autopilot and automatic landing system while the aircraft is in the air, and will be able to point out if any of the avionic systems require attention.

Item (Integrated Test and Maintenance System) was conceived by Aerospatiale, Marconi-Elliott Avionic Systems and its French Partner, Sfen.

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## LED Technology-Part III

## Differences Distinguish COM Recorders Presently Using Light-Emitting Diodes

By Mark Flomenhoft

Special to Computerworld

The differences that distinguish the three LED COM recorders presently marketed are as interesting as their common advantages — low price and reliable operation — are significant. Perhaps the best way to reveal the extent of their disparity is to state the number of diodes present in each system — 140 in the Memorex 1603, 924 in the Sequential S/COM-70, and only 32 in the Quantor 100N.

One property is the same in all three devices. Diodes that radiate in the extended red region of pandromatic film are used rather than diodes that emit energy in the infrared spectrum. This decision has been made because resolution and sensitivity are better in extended red film than in infrared sensitive film.

In the 1603 the traditional CRT display screen is replaced by an assembly face, where the tips of 4620 fiber optic conductors form 132 5 by 7 character

matrices. The other end of the fibers attach to the diodes. Evidently, each diode is connected to 33 strands.

As governed by digital signals received from the computer, certain diodes are illuminated for a very short period, and their light is conducted by the fibers to the assembly face. Here the tips glow to form 33 recurring sets.

A rotating disk with 12 slots at 30 degree intervals is synchronized to place one of its slots in position to pass light from the first three characters. The slot width is restricted to accept light from only three characters so that, as the shutter rotates, light from the fourth character will be transmitted rather than from the first character of the next set.

Light passing through the slot falls upon a mirror, which reflects it to a lens system and upon 16 mm film at the start of a character line.

After a full line has been exposed, the film is advanced one character line, and the preceding

positions are left blank for spacing. It should be apparent that at any given time diodes are illuminated in accordance with the incoming digital codes to represent a particular horizontal row of 5 by 7 character dot matrices.

Thus, where the Memorex 1603 records an entire character line at a time and then advances the film, the Sequential S/COM-70 records a dot line at a time and advances the film.

Like the Memorex 1603, the Sequential S/COM-70 records in cine mode on 16 mm film. By means of its optional universal camera, it can format the standard microfiche on 105 mm film as well, either at a reduction ratio of 24X (80 frames per fiche) or 42X (224 frames per fiche). In addition, the camera is capable of recording on 35mm and 70mm film.

When employed in the same way as the Memorex 1603, the S/COM-70 prints at the continuous rate of 15,000 lines per minute and generates 225 standard frames per minute. This throughput is due in part to a specified frame pulldown time of only 10 msec for a frame separation of 10 character lines (1 msec/character-line).

Perhaps the outstanding attribute of the S/COM-70 is simplicity. Simple devices are usually inexpensive, and the \$32,850 purchase price of the alphanumeric printer is presently the second lowest. It is also extremely easy to operate.

The Quantor 100N microfilm printer employs only 32 photodiodes. A tiny mirror is associated with each diode, and the mirrors are rotated in synchronism by a precision motor so that light from the corresponding diodes is deflected linearly across the width of 16mm film.

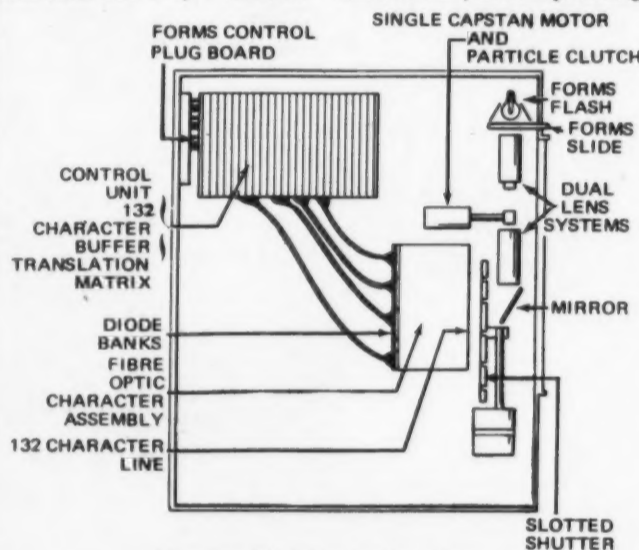
If at regular intervals certain diodes are illuminated for short bursts in accordance with the digital signals received from the host computer, appropriate dots along a horizontal row on the film will be recorded. Clearly, the basic principle of character generation parallels the dot-line technique of the Sequential S/COM-70.

In particular, after each dot row on the film has received its sequence of recorded dots, the film is indexed to the next dot line and the mirrors are returned to their starting positions.

A major improvement of the Quantor 100N over the other systems is the use of a 7 by 10 matrix structure instead of 5 by 7. This provision results in excellent print quality and should overcome industry complaints about eye fatigue.

The 100N prints only on 16mm film at the rate of 10,000 line/min and formats frames only in cine mode. Its price of \$29,995, is the lowest of any alphanumeric printer. Like the S/COM-70 the 100N has a limited graphics capability.

This is the third in a series of articles on the use of light-emitting diodes in the COM industry. Mr. Flomenhoft is Associate Editor of Auerbach Graphic Processing Reports.



Memorex Fiber Optics Recording

WHEN is a computer terminal "smart" enough to be considered intelligent?

WHAT kinds of intelligent terminals are there?

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cycle is repeated. After 64 lines are recorded, the film is indexed 14 lines to the start of the next frame. In this manner a standard computer printout of 64 lines, 132 characters per line, is compressed into one frame on film.

10,000 Line/min.

The time required to print a line and index the film to the next character line is 6 msec, of which 3 msec are expended on printing and 3 msec on film indexing. If the machine would operate continuously, therefore, 10,000 line/min would be printed.

Pulldown requires only 28 msec since film movement during this process can be accelerated to average 2 msec per line. A simple calculation puts the throughput at 145 page/min. At present 16 mm film is the only output medium of the 1603 microfilmer, and cine mode is the only recorded format. It sells for \$44,250.

The Sequential S/COM-70 has eliminated fiber-optic conductors by arraying 924 diodes in a single compact row. These diodes are divided into 132 groups of seven elements.

During recording only five elements are actually used and two



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## Nickels & Dimes

Hewlett-Packard's board of directors has declared a regular semiannual dividend of 10 cents per share payable on Oct. 15 to holders of record Sept. 24.

\$\$\$

Clasco Inc. has received a \$1.3 million line of credit from a group of Virginia Commonwealth Bankshares member banks headed by The American Bank. The funds will be used to finance student receivables under the firm's deferred tuition plan.

\$\$\$

A financing agreement in excess of \$5 million has been announced between Precision Instrument Co. and Chase Manhattan Capital Corp., a wholly owned subsidiary to the Chase Manhattan Bank. Included in the financing arrangement is a mortgage on Precision's facility in the Stanford Industrial Park through Aetna Life Insurance Co.

\$\$\$

Digital Computer Controls Inc. stockholders have approved an increase in authorized common stock from 1.5 million shares to 5 million shares. The firm said that it would file with the Securities and Exchange Commission within a month concerning a public offering of 450,000 shares.

# More Mainframe Firms Announce Results

By a CW Staff Writer

The results remain mixed as three more mainframe manufacturers have released revenue and earnings reports for the second quarter and first six months of 1971.

All three in the current batch — NCR, Burroughs, and Xerox — showed increased revenues for the reporting periods, but those increases did not always reflect increased computer operations for them.

NCR said that sales for the first six months totaled \$711 million, a jump over the \$655 million reported last year. At the same time, however, earnings declined from \$19.4 million (88 cents per share) last year to \$12.5 million (57 cents per share) this year.

Earnings in the second quarter were also down, dropping to \$7 million (32 cents per share) on sales of \$367 million from the \$10.8 million (49 cents per share) registered on sales of \$347 million in the year earlier period.

The decline in earnings was caused by the same factors which adversely affected first-quarter results, according to Robert S. Oelman, chairman.

Xerox was able to register a 10% increase in earnings while sales rose by 16% in the second quarter, but with no help from the computer operation.

For the entire first six months, the firm earned \$102.4 million (\$1.30 per share) up 9% from \$94 million (\$1.20 per share). Revenues jumped 14% in the

half from \$830.8 million to \$948.9 million.

Even though earnings and sales were up for the firm, the operations of Xerox Data Systems caused some adverse effects on the firm's financial picture, according to C. Peter McColough. He added, however, that there had been an upturn in orders for the division.

The only unabashed bright spot in the earnings and revenue picture comes from Burroughs Corp., which reported a 10% increase in earnings and an 8% increase in sales during the first six months of 1971 compared to

the same period in 1970.

Earnings for the six months reached \$27.9 million (\$1.52 per share) on sales of \$433.9 million compared with income of \$25.3 million (\$1.47 per share) on revenue of \$402.7 million in the same year-ago period.

Both earnings and revenues set records for a six month period, Burroughs said.

Second quarter earnings were \$16.9 million (92 cents per share), an 8% increase over the 1970 second quarter of \$15.6 million (91 cents per share). Revenue for the quarter was \$225.8 million, a 6% increase

compared with last year's second quarter revenue of \$213.6 million.

Worldwide incoming orders from all major product areas, with the exception of government custom contracts, increased over last year's six month order position, Ray W. Macdonald, president, said.

Standard products and services increased 4% over the 1970 period. Government custom contract orders during the 1971 period declined 23% and total worldwide orders increased 3% over last year's six month position, Macdonald stated.

## Sperry Meets, Elects Lyet President

By a CW Staff Writer

NEW YORK — Univac is no longer second to IBM, according to J. Frank Forster, chairman of the board and chief executive officer of parent company Sperry Rand. In a tongue-in-cheek answer to a stockholder's question at Sperry's annual meeting, Forster said his firm is equal to IBM but the leader just happens to be somewhat larger.

On a more serious note, Forster announced that J. Paul Lyet would become president of Sperry Rand, apparently passing over Robert E. McDonald who remains as executive vice-president of the parent company and president of the Univac Division.

Asked whether the choice of Lyet, who previously was executive vice-president along with McDonald, meant a lessened emphasis on computer technology for the corporation, Forster said Lyet was moving only with respect to providing a continuity of management and he indicated that McDonald could later be selected for one of the other two top executive posts when Forster retires

in two years.

In the business equipment category (Univac) new orders for computer systems held at the same level as last year's first quarter, he said, and the present backlog for data processing equipment "is at a high level."

Touching on current economic conditions, Forster said Sperry sales for the first quarter were \$414.2 million down from \$427.1 million for the same period last year.

Describing these results as "disappointing," Forster said he was "at a complete loss to predict what this economy is going to do."

The natural tendency for users to lease rather than purchase DP equipment has had the effect of "postponing profits for future periods," Forster said.

Asked by a stockholder to explain the recent decline of Sperry's stock, Forster said the "flat earnings of IBM" had affected all computer companies. But no internal corporate reasons currently exist for the stock downturn, he said.

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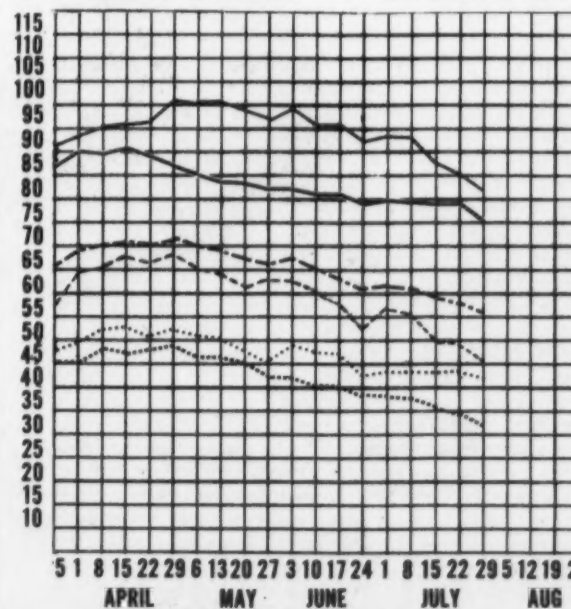
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CLOSING PRICES THURSDAY, JULY 29, 1971

E X C H		PRICE				E X C H		PRICE			
		1971 RANGE (1)	CLOSE JUL 29 1971	WEEK NET CHNGE	WEEK PCT CHNGE			1971 RANGE (1)	CLOSE JUL 29 1971	WEEK NET CHNGE	WEEK PCT CHNGE
SOFTWARE & EDP SERVICES											
O	ADVANCED COMP TECH	1- 4	1 1/2	0	0.0	N	3M COMPANY	96-122	115 1/2	-2 3/4	-2.3
A	APPLIED DATA RES.	5- 13	6 1/8	+ 1/8	+2.0	O	MOORE BUS. FORMS	37- 42	40 1/8	- 7/8	-2.1
O	APPLIED LOGIC	1- 3	3/4	0	0.0	N	NASHUA CORP	29- 47	41	-2 3/8	-5.4
O	ARIES	1- 2	1 1/8	0	0.0	O	PEYNOLDS & REYNOLD	37- 58	56 1/4	- 1/2	-0.8
N	AUTOMATIC DATA PROC	44- 65	60 1/4	-1 1/4	-2.0	O	STANDARD REGISTER	18- 23	18 1/8	-1 1/8	-5.8
O	AUTO SCIENCES	4- 8	4 1/4	- 7/8	-17.0	O	TAB PRODUCTS CO	8- 17	15 1/4	+ 3/8	+2.5
O	BOOTHE DATA SYS	1- 2	1	0	0.0	N	UARCO	25- 34	30 3/4	-2 3/4	-8.2
O	BRANDON APPLIED SYS	1- 1	5/8	0	0.0	A	WABASH MAGNETICS	7- 10	7	- 1/2	-6.6
O	COMPUTER ENVIRON	1- 2	3/4	0	0.0	N	WALLACE BUS FORMS	18- 26	22 3/8	0	0.0
O	COMPUTER NETWORK	2- 11	4 1/2	0	0.0	COMPUTER SYSTEMS					
O	COMPUTER PROPERTY	5- 11	5 3/4	- 1/4	-4.1	N	BURROUGHS CORP	105-138	117 1/2	-1 1/4	-1.0
N	COMPUTER SCIENCES	9- 17	10 1/4	- 7/8	-7.8	N	COLLINS RADIO	12- 20	12 5/8	+ 3/8	+3.0
O	COMPUTER TASK GROUP	1- 3	2	- 1/4	-11.1	N	CONTROL DATA CORP	48- 83	53 1/4	-2 1/8	-3.8
O	COMPUTER USAGE	5- 16	8	- 1/8	-1.5	O	DATA GENERAL CORP	19- 50	44 5/8	-2 5/8	-5.5
O	COMP AUTOMOT REPORTS	6- 13	11 1/8	+1 1/2	+15.5	N	DIGITAL EQUIPMENT	53- 85	67	- 3/8	-0.5
N	COMPUTING & SOFTWARE	27- 45	29 3/8	-1 3/8	-4.4	N	ELECTRONIC ASSOC.	5- 9	6 1/4	- 1/2	-7.4
O	COMRESS	2- 4	2 1/4	+ 1/8	+5.8	N	FOXBORO	25- 46	37 7/8	-2 7/8	-7.0
O	COMSHARE	4- 8	4 5/8	0	0.0	A	GENERAL AUTOMATION	11- 26	10 3/4	-1	-8.5
O	CONSOL. ANAL. CENT.	1- 2	1 1/8	- 1/8	-10.0	N	GENERAL ELECTRIC	53-124	53 1/8	-1 3/8	-2.5
O	DATA AUTOMATION	1- 4	1 3/8	- 1/8	-8.3	N	HEWLETT-PACKARD CO	30- 455	-6 3/4	-3 1/8	-7.8
O	DATA PACKAGING	6- 10	8 5/8	- 3/8	-4.1	N	HONEYWELL INC	83-115	93 7/8	-3 1/2	-3.5
O	DATAMATION SERVICE	1- 3	1	0	0.0	N	IBM	293-364	296 3/4	-2 3/4	-0.9
L	DATATAB	4- 10	7	- 1/4	-3.4	O	INTERDATA INC	6- 11	8 1/4	- 3/8	-4.3
O	DIGITEK	1- 4	1 1/4	0	0.0	N	NCR	38- 49	39 3/8	-1 7/8	-4.5
O	EDP RESOURCES	7- 16	7 3/4	-1 3/4	-18.4	N	RCA	26- 41	31	-3 1/2	-10.1
A	ELECT COMP PROG	3- 7	3 3/8	- 1/8	-3.5	N	RAYTHEON CO	27- 46	33 3/8	-3 3/8	-9.1
N	ELECTRONIC DATA SYS.	53- 85	54 3/8	- 5/8	-1.1	O	SCI. CONTROL CORP.	1- 2	3/4	- 1/8	-14.2
O	INFORMATICS	7- 15	9 3/4	-1 3/8	-12.3	N	SPERRY RAND	25- 38	27 7/8	-1	-3.4
A	ITEL	12- 23	11 3/4	-1	-7.8	A	SYSTEMS ENG. LABS	9- 18	9 3/4	- 3/8	-3.7
O	KEANE ASSOCIATES	5- 14	6	0	0.0	N	VARIAN ASSOCIATES	13- 18	12 7/8	- 7/8	-6.3
O	KEYDATA CORP	8- 14	8 1/2	+ 3/8	+4.6	N	VICTOR COMPTOMETER	15- 27	16	- 5/8	-3.7
A	MANAGEMENT DATA	8- 11	8 3/4	0	0.0	N	WANG LABS.	29- 50	40 3/4	+ 1/8	+0.3
O	NATIONAL CSS INC	7- 14	8	- 1/2	-5.8	N	XEROX CORP	85-119	113 1/2	-2 1/8	-1.8
O	NAT. COMP. ANALYSTS	1- 4	1 1/4	- 1/8	-9.0	LEASING COMPANIES					
O	NAT. COMP. SERV.	2- 4	1 5/8	- 3/8	-18.7	A	BOOTHE COMPUTER	13- 27	16 1/4	-2 1/8	-11.5
N	PLANNING RESEARCH	16- 26	17 7/8	-2	-10.0	O	BRESNAHAN COMP.	2- 4	3	- 3/8	-11.1
O	PROGRAMMING METHODS	18- 29	24	+ 1/2	+2.1	O	COMPUTER EXCHANGE	4- 9	4	-1	-20.0
O	PROGRAMMING & SYS	2- 4	2 1/8	+ 1/8	+6.2	A	COMPUTER INVSTRS GRP	8- 14	10 3/8	+ 1/8	+1.2
L	PROGRAMMING SCIENCES	1- 3	1/8	- 1/8	-50.0	N	DATA PROC. F & G	11- 19	13 3/8	+ 7/8	+7.0
O	SCIENTIFIC COMPUTERS	2- 3	2 3/8	0	0.0	O	DATRONIC RENTAL	2- 4	2 3/8	- 1/8	-5.0
O	SCIENTIFIC RESOURCES	1- 2	3/8	0	0.0	A	DEARBORN-STORM	24- 44	37 1/4	-3 1/2	-8.5
O	SOFTWARE SYSTEMS	1- 2	1 3/8	0	0.0	N	DIEROLD COMP. LEAS.	5- 13	8 1/2	- 1/4	-2.8
O	TBS COMPUTER CENTERS	5- 9	4 1/2	0	0.0	A	DPA, INC.	4- 8	7 1/8	- 3/8	-5.0
O	TOLLEY INTL CORP	3- 8	6 1/2	- 1/4	-3.7	N	U.S. LEASING	16- 30	24 1/4	-3 3/4	-13.3
O	UNITED DATA CENTER	2- 7	3 1/8	- 1/4	-7.4	O	LECTRO MGT INC	2- 5	2 1/2	0	0.0
N	UNIVERSITY COMPUTING	21- 38	25 5/8	-2	-7.2	A	LEVIN-TOWNSEND CMP	5- 9	5 3/8	- 3/8	-6.5
A	URS SYSTEMS	7- 11	6 5/8	0	0.0	O	MANAGEMENT ASSIST	1- 2	3/4	0	0.0
O	U.S. TIME SHARING	1- 3	7/8	- 1/4	-22.2	A	MARSHALL INDUSTRIES	14- 27	14 7/8	-1 3/8	-8.4
O	VORTEX CORP	2- 5	2	- 1/2	-20.0	A	MILCO ELECTRONICS	14- 26	14 3/8	-1 7/8	-11.5
PERIPHERALS & SUBSYSTEMS											
N	ADDRESSOGRAPH-MULT	24- 48	36	-3 1/2	-8.8	N	MOHAWK DATA SCI	23- 47	25 5/8	- 3/8	-1.4
O	ALPHANUMERIC	2- 6	2	- 1/8	-5.8	O	ON LINE SYSTEMS INC	7- 18	11	- 1/4	-2.2
N	AMPEX CORP	17- 25	16 1/2	- 5/8	-3.6	O	OPTICAL SCANNING	10- 18	10 1/4	- 1/2	-4.6
O	ASTRODATA	1- 2	1 1/4	0	0.0	O	PHOTON	7- 12	7	- 3/8	-5.0
O	ATLANTIC TECHNOLOGY	3- 8	5 5/8	+ 3/8	+7.1	O	PHOTO-MAGNETIC SYS.	1- 6	2	- 1/4	-11.1
A	BOLT, BERANEK & NW	5- 8	5 1/8	- 3/4	-12.7	A	POTTER INSTRUMENT	14- 25	14 3/8	-2 1/4	-13.5
N	BUNKER-RAMO	10- 17	10 1/4	- 5/8	-5.7	O	PRECISION INST.	7- 16	11	-2 1/2	-18.5
A	CALCOMP	19- 33	18 3/4	-2 7/8	-13.2	O	RECOGNITION EQUIP	14- 26	14 1/8	- 7/8	-5.8
O	COGNITRONICS	4- 9	3 5/8	- 3/8	-9.3	O	REDCOR CORP.	5- 9	4 3/4	-1 1/8	-19.1
O	COLORADO INSTRUMENTS	3- 8	2 1/2	- 1/8	-4.7	N	SANDERS ASSOCIATES	11- 22	10 5/8	-1 1/4	-10.5
O	COMPUTER COMMUN.	6- 19	8 1/4	-1 3/8	-14.2	O	SCAN DATA	6- 15	10	-1 1/2	-13.0
A	COMPUTER EQUIPMENT	4- 7	4	- 1/4	-5.8	N	TALLY CORP.	8- 16	8 1/8	-1 1/8	-12.1
A	COMPUSET	8- 20	7 7/8	-2 1/2	-24.0	N	TELEX	13- 22	13 1/8	-1 1/8	-7.8
O	CONSOL COMPUTER LTD.	8- 12	9 5/8	+1 1/8	+13.2	O	VIATRON	1- 4	1 1/4	+ 1/4	+25.0
A	DATA PRODUCTS CORP	6- 10	6 1/8	0	0.0	SUPPLIES & ACCESSORIES					
O	DATA TECHNOLOGY	3- 9	4 1/2	- 1/8	-2.7	N	ADAMS-MILLIS CORP	12- 19	12 1/8	- 3/4	-5.8
O	DIGITRONICS	4- 8	5 1/8	+ 1/8	+2.5	O	BALTIMORE BUS FORMS	6- 10	8 1/4	0	0.0
N	ELECTRONIC M & M	8- 16	10 3/8	-1 1/4	-10.7	A	BARRY WRIGHT	8- 13	8	- 3/8	-4.4
O	FABRI-TEK	2- 4	2 3/8	- 1/8	-5.0	A	DATA DOCUMENTS	17- 29	16 3/4	-1 3/4	-9.4
O	FARRINGTON MFG	1- 3	1 1/4	0	0.0	O	DUPLEX PRODUCTS INC	8- 10	9	- 3/8	-4.0
O	FOTO-MEM INC	1- 6	1	0	0.0	N	ENNIS BUS. FORMS	8- 13	8 1/8	- 1/4	-2.9
O	INFOREX INC	29- 49	33	+ 1/4	+0.7	O	GRAHAM MAGNETICS	9- 35	22 1/2	-1 1/4	-5.2
O	INFORMATION DISPLAYS	5- 8	5 3/8	- 3/8	-6.5	O	GRAPHIC CONTROLS	6- 15	10 3/4	- 1/4	-2.2
O	MANAGEMENT ASSIST	1- 2	3/4	0	0.0	N	MEMOREX	27- 78	28	-3 5/8	-11.4
A	MARSHALL INDUSTRIES	14- 27	14 7/8	-1 3/8	-8.4						
A	MILCO ELECTRONICS	14- 26	14 3/8	-1 7/8	-11.5						
N	MOHAWK DATA SCI	23- 47	25 5/8	- 3/8	-1.4						
O	ON LINE SYSTEMS INC	7- 18	11	- 1/4	-2.2						
O	OPTICAL SCANNING	10- 18	10 1/4	- 1/2	-4.6						
O	PHOTON	7- 12	7	- 3/8	-5.0						
O	PHOTO-MAGNETIC SYS.	1- 6	2	- 1/4	-11.1						
A	POTTER INSTRUMENT	14- 25	14 3/8	-2 1/4	-13.5						
O	PRECISION INST.	7- 16	11	-2 1/2	-18.5						
O	RECOGNITION EQUIP	14- 26	14 1/8	- 7/8	-5.8						
O	REDCOR CORP.	5- 9	4 3/4	-1 1/8	-19.1						
N	SANDERS ASSOCIATES	11- 22	10 5/8	-1 1/4	-10.5						
O	SCAN DATA	6- 15	10	-1 1/2	-13.0						
O	TALLY CORP.	8- 16	8 1/8	-1 1/8	-12.1						
N	TELEX	13- 22	13 1/8	-1 1/8	-7.8						
O	VIATRON	1- 4	1 1/4	+ 1/4	+25.0						
SUPPLIES & ACCESSORIES											
N	ADAMS-MILLIS CORP	12- 19	12 1/8	- 3/4	-5.8						
O	BALTIMORE BUS FORMS	6- 10	8 1/4	0	0.0						
A	BARRY WRIGHT	8- 13	8	- 3/8	-4.4						
A	DATA DOCUMENTS	17- 29	16 3/4	-1 3/4	-9.4						
O	DUPLEX PRODUCTS INC	8- 10	9	- 3/8	-4.0						
N	ENNIS BUS. FORMS	8- 13	8 1/8	- 1/4	-2.9						
O	GRAHAM MAGNETICS	9- 35	22 1/2	-1 1/4	-5.2						
O	GRAPHIC CONTROLS	6- 15	10 3/4	- 1/4	-2.2						
N	MEMOREX	27- 78	28	-3 5/8	-11.4						

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